NEW AMERICAN SUPPLEMENT

TO THE LATEST EDITION OF THE

ENCYCLOPÆDIA BRITANNICA

A STANDARD WORK OF REFERENCE IN

ART, LITERATURE, SCIENCE, HISTORY, GEOGRAPHY
COMMERCE, BIOGRAPHY, DISCOVERY
AND INVENTION

EDITED UNDER THE PERSONAL SUPERVISION OF

DAY OTIS KELLOGG, D.D.

Formerly Professor of English Literature and History, Kansas State University, etc., etc.

ASSISTED BY A CORPS OF EXPERIENCED WRITERS

ENRICHED BY MANY HUNDRED SPECIAL ARTICLES CONTRIBUTED BY MEN AND WOMEN OF INTERNATIONAL REPUTATION

Illustrated with over Fifteen Hundred Portraits and Other Engravings

IN FIVE VOLUMES
VOLUME II

A Gift from the Estate of
Michael S. Hart

www.gutenberg.org

NEW YORK
THE WERNER COMPANY
CHICAGO
1900

COPYRIGHT, 1897
BY
THE WERNER COMPANY

ILLUSTRATIONS

IN THIS VOLUME.

PAGE

American Canals, Cross Sections of 682
Canals, Cross Sections of 682
Caravel, The Santa Maria 694
Charleston, The Battery 755
Charter Oak 757
Chatsworth House 760
Chemistry, Fig. A 772
Chicago Public Library 783
City Hall, Chicago 782
Cœnocyte 855
Drainage Canal, Chicago to Lockport, Map of 681
Electricity, 116 cuts and diagrams 1134–72
Embryology, Figs. 1 and 2 1192–93
Embryo-sac 1195
Equus Prezewalskii 1210
Ferris Wheel 1261
Football, Diagram of American Intercollegiate Field 1303
Football, Diagram of Association Field 1302
Football, Diagram of Australian Field 1303
Football, Diagram of Rugby Field 1302
Foreign Canals, Cross Sections of 682
Odd Fellows Building, Cincinnati 806
Spirogyra, Two Filaments of 894
Steam Fire-Engine 1275

STATE SEALS.

California 653
Colorado 869
Connecticut 895
Delaware 1018
Florida 1291

STATE CAPITOL BUILDINGS.

Denver, Colorado 870
Dover, Delaware 1018
Hartford, Connecticut 896
Sacramento, California 657
Tallahassee, Florida 1292

COLLEGE AND UNIVERSITY BUILDINGS.

Clark University, Worcester, Mass 821
Colgate University, Hamilton, N. Y 862
Colorado College, Colorado Springs, Colo 871
Columbia College, New York City 874
Columbian University, Washington, D. C 874
Cornell University, Ithaca, N. Y 920
Dartmouth College, Hanover, N. H 988
Dickinson College, Carlisle, Pa 1044
Earlham College, Richmond, Ind 1105

PAGE

MAPS.

Cuba 957
Drainage Canal, Chicago to Lockport 681

PORTRAITS.

Cable, George W 644
Caine, Hall 648
Calvé, Emma 660
Cameron, James Donald 665
Canby, Edward Richard Sprigg 683
Carey, Henry C 698
Carlisle, John G 700
Carlos I 700
Carlyle, Thomas 701
Carnegie, Andrew 703
Carnot, François Sadi 704
Carson, Kit 712
Cary, Annie Louise 715
Castelar, Emilio 719
Cervera y Topete, Don Pascual 738
Chamberlain, Joseph 742
Chambord, Comte de 744
Chandler, William E 747
Charles I, King of Roumania 754
Childs, George W 789
Choate, Joseph H 794
Choate, Rufus 794
Christian IX, King of Denmark 797
Churchill, Lord Randolph 804
Claflin, Horace B 813
Clarke, James Freeman 819
Clay, Cassius M 824
Clemens, Samuel L 828
Cleveland, Grover 831
Cobbe, Frances Power 850
Cody, William F 854
Coke, Thomas 859
Colfax, Schuyler 862
Collins, Wilkie 865
Colvin, Sidney 875
Conkling, Roscoe 894
Constant, Benjamin 899
Conway, Moncure D 907
Cooley, Thomas M 909
Cooper, Peter 910
Cope, Edward D 911
Coquelin, Benoit Constant 915
Corcoran, William W 916
Cornell, Ezra 920
Corrigan, Michael Augustine 922
Corwin, Thomas 923

ILLUSTRATIONS

	PAGE
Coues, Elliott	927
Courbet, Gustave	929
Courthope, William J	930
Cox, Kenyon	933
Coxe, Arthur Cleveland	934
Crane, Stephen	936
Crawford, F. Marion	938
Crisp, Charles F	944
Crispi, Francesco	944
Crockett, David	946
Cronwright-Schreiner, Olive	949
Crook, General George	949
Cross, Mary Ann ("George Eliot")	951
Cruikshank, George	956
Cullom, Shelby M	962
Cummins, George David	965
Curtis, George W	968
Cushing, Caleb	970
Cushman, Charlotte S	971
Custer, General George A	972
Dahlgren, Admiral John Adolph	978
Dallas, George M	980
Dana, Charles A	983
Dana, James D	984
Dana, Richard H	984
Daniel, John Warwick	985
Darwin, Charles Robert	989
Daudet, Alphonse	991
Davenport, Fanny	992
Davis, Judge David	995
Davis, Jefferson	996
Davis, Judge Noah	998
Dawes, Henry L	999
Decatur, Stephen	1008
Deland, Margaret W	1017
De la Ramée, Louise	1017
Dennison, William	1027
Depew, Chauncey M	1029
De Reszke, Jean	1032
De Vinne, Theodore L	1037
Diaz, Porfirio	1041
Dickinson, Don M	1043
Dilke, Sir Charles	1048
Dillon, John	1049
Dix, Morgan	1058
Doane, William Croswell	1059
Dodge, Mary Abigail	1060
Dodge, Mary Mapes	1061
Doré, Gustave	1067
Douglass, Frederick	1071
Doyle, A. Conan	1074
Draper, Henry	1079
Drew, Daniel	1081
Drexel, Anthony J	1082
Drummond, Henry	1084
Du Chaillu, Paul B	1086
Dudley, Thomas Underwood	1088
Dufferin, Marquis of	1089
Dumas, Alexander (Fils)	1091
Du Maurier, George L. P. B	1092
Dupont, Admiral Samuel Francis	1095
Duse, Eleonora	1097
Dvorák, Antonin	1100
Dwight, Theodore W	1101
Dwight, Timothy	1101
Eads, James B	1104
Early, Jubal A	1105
Ebers, Georg M	1110
Edison, Thomas A	1115
Edmunds, George F	1116
Edwards, Amelia B	1123
Eggleston, Edward	1125
Eiffel, Gustave	1128
Eliot, Charles W	1178
Ellsworth, Ephraim E	1183
Ely, Richard T	1185
Emerson, Ralph W	1195
Endicott, William C	1200
Ericsson, John	1212
Eugénie, ex-Empress	1219
Eustis, James B	1220
Evarts, William M	1223
Ewell, General R. S	1226
Fairbanks, Thaddeus	1237
Fairchild, Charles S	1238
Faithful, Emily	1240
Fallows, Bishop Samuel	1241
Farrar, Dr. Frederick W	1249
Farwell, Charles B	1249
Faure, François Félix	1250
Feehan, Archbishop Patrick A	1255
Ferdinand I, Prince of Bulgaria	1258
Ferris, George W. G	1260
Field, Cyrus W	1264
Field, Eugene	1264
Fish, Hamilton	1279
Fisk, Clinton B	1282
Fiske, John	1282
Flammarion, Camille	1286
Flint, Dr. Austin	1289
Flower, Roswell P	1294
Foote, Mary (Hallock)	1304
Forbes, Archibald	1307

CONTRIBUTIONS FROM SPECIAL WRITERS

IN THIS VOLUME.

CABLE RAILWAYS.
CALCULATING-MACHINES.
CALORIMETER.
CAN-MANUFACTURE AND CANNERS' TOOLS.
CANNING INDUSTRY.
CANOE, MODERN AND PLEASURING.
CAR-CONSTRUCTION, ELECTRIC.
CARBURETER.
CARPENTRY.
CHESS, CHANGE OF STYLE IN MODERN PLAY.
CLOCK, ELECTRIC.
COLOR-PRINTING.
COLOR-WHEEL.
COMMUTATOR.
CRANES.
CREMATION.
CURRENT-METER.
DENSIMETER.
DEPHLEGMATOR.
DILATOMETER.
DYNAMITE-GUN.
EIDOLOSCOPE.
EIDOSCOPE.
ENUCLEATOR.
FIRE-ALARMS.
FISHWAY.
FLUORESCENT LAMP.
FLUOROSCOPE.
CHARLES HENRY COCHRANE, M.E., author of *Artistic Homes, and How to Decorate Them*; *The Wonders of Modern Mechanism* (1896); etc.

CAMERAS.
EDWARD L. WILSON, Editor *Wilson's Photographic Magazine;* author of *Quarter-Century in Photography.*

CANADA.
CROSS, MRS. MARY ANN.
COTES, EVERARD.
DAWSON, SIR J. WILLIAM.
EMERSON, RALPH WALDO.
G. MERCER ADAM, founder of *The Canadian Monthly;* formerly Editor of *The Canada Educational Monthly*; author of *Life of Sir John A. Macdonald*, etc.; and Editor *Self Culture*, Chicago, Ill.

CANADIAN LITERATURE.
FRED LEWIS PATTEE, M.A., Professor of English and Rhetoric, Pennsylvania State College; author of *A History of American Literature*; etc.

CANAL.
LYMAN E. COOLEY, C.E., Engineer United States Deep Waterways Commission; formerly Chief Engineer and member Board of Trustees of the Sanitary District of Chicago; etc.

CAPRIFICATION.
CLASSIFICATION.
DIMORPHISM.
ECOLOGY.
JOHN M. COULTER, LL.D., Head Professor of Botany, University of Chicago.

CARDINAL.
CONCLAVE.
CONGREGATIONS, ROMAN.
CONSISTORY.
REV. P. A. BAART, A.M., of the Diocese of Detroit.

CASTING-VOTE.
CHARITY ORGANIZATION.
CONFEDERATE STATES OF AMERICA, OR SOUTHERN CONFEDERACY.
COPYRIGHT.
DAY OTIS KELLOGG, D.D., Editor New Supplement to the ninth edition of the ENCYCLOPÆDIA BRITANNICA; formerly Professor of English Literature and History, Kansas State University.

CERAMIC ART.
W. D. WILLES, Press Club, New York.

CHEESE.
HENRY C. WALLACE, Editor *The Creamery Gazette*, Des Moines, Iowa.

CHEMISTRY.
ELECTROLYSIS.
ALEXANDER SMITH, Ph.D., Assistant Professor of General Chemistry, University of Chicago.

CHRISTOLOGY.
CONSUBSTANTIATION.
CRITICISM, HIGHER.
EVIDENCES OF CHRISTIANITY.
FRANKLIN JOHNSON, D.D., Professor, Divinity Department, University of Chicago.

CLUBS, WOMEN'S.
ELLEN M. HENROTIN, President General Federation of Women's Clubs.

COAL-MINING IN THE UNITED STATES.
BAIRD HALBERSTADT, Mining Engineer and Geologist; member of Pennsylvania Board of Examiners; etc.

COAST DEFENSES OF THE UNITED STATES.
NELSON A. MILES (Maj.-Gen.), commanding the Army of the United States, Washington, D.C.

COINAGE LAWS.
DEBT, UNITED STATES NATIONAL.
FINANCES OF THE UNITED STATES.
JOHN SHERMAN, Ex-Secretary of the Treasury; United States Senator from Ohio; Secy. of State.

COINS OF THE UNITED STATES.
COPPER-MINING IN THE UNITED STATES.
JOHN F. CARGILL, formerly U. S. Deputy Mineral Surveyor; author of *A Freak in Finance*; etc.

CONGRESS, AND THE LEGISLATIVE POWER OF THE UNITED STATES.
THOMAS B. REED, Speaker Fifty-first and Fifty-fourth Congresses, etc., Washington, D.C.

DEMOCRATIC PARTY.
FEDERALIST PARTY.
JOHN BACH MCMASTER, C.E., Ph.D., Professor of American History, University of Pennsylvania; author of *A History of the People of the United States from the Revolution to the Civil War*, etc.

EDUCATION IN THE UNITED STATES, HIGHER.
B. A. HINSDALE, Ph.D., LL.D., Professor of the Art and Science of Teaching, University of Michigan.

ELEVATORS, OR LIFTS.
W. E. HALE, inventor of the Hale Elevator, etc.

ELECTRICITY.
S. W. STRATTON, Ph.D., Ryerson Physical Laboratory, University of Chicago.

EMBRYOLOGY.
WILLIAM ALBERT LOCY, Ph.D., Professor of Zoölogy, Northwestern University, Evanston, Ill.

ENGRAVING.
ALBERT G. GLOVER, Editor *Engraver and Printer*, Boston, Mass.

FIRE INSURANCE IN THE UNITED STATES SINCE 1879.
A. H. HULING, Editor *The Argus.*

FOOTBALL.
WALTER CAMP, author of *Football, Facts and Figures*; etc.

C

CAAING-WHALE—CABEZÓN DE LA SAL

CAAING-WHALE (*Globicephalus melas*), one of the Cetacea, in the dolphin family, belonging to a genus common in all seas, and oftener stranded than any other "whale." The length varies from 16 to 24 feet; the maximum girth is about 10 feet. It feeds chiefly on cuttle-fish. Many names are given to these common cetaceans; among the most popular are *pilot whale*, *blackfish*, *social whale* and *grindhoal*. (See WHALE, Vol. XXIV, p. 525.) The word *caaing* is not the Scottish form of *calling*, as has been supposed, but is a totally different Scotch word, which signifies *driving*. Caaing-whale appears to be originally an Orkney or Zetland name. Another species of the same genus (*G. rissoanus*), 9 or 10 feet long, the male of a bluish white color, the female brown, both sexes marked with irregular white lines and brown spots, is found in the Mediterranean.

CAB, a carriage with either two or four wheels, and drawn by one horse. The name is derived from the *cabriolet-de-place*, introduced into England from France at the beginning of the present century. (See CARRIAGE, Vol. V, p. 136.) In Paris the *cabriolet-de-place* was introduced about the middle of the seventeenth century by Nicholas Sauvage, whose residence in the Rue St. Martin, at the Hotel St. Fiacre, has given the name of fiacres to the public carriages of that city. The cabs of foreign countries and of our own chief towns have their peculiar features, and are governed by police or municipal regulations. The name is also applied to the covered part of a locomotive which shelters the engineer and fireman and shields the gauges and levers.

CABAL, a term now employed to denote a small, intriguing, factious party, united for political or personal ends. It had been previously used to denote a secret committee or cabinet, when, during 1667–73, it was especially applied to Charles II's infamous ministry. (See CABINET, Vol. IV, p. 619.) The derivation goes back to the Hebrew *Kabalah*.

CABALLERO, FERNAN, pseudonym of a Spanish novelist. See FABER, CECILIA, Vol. VIII, p. 833.

CABANEL, ALEXANDRE, artist; born in Montpellier, France, Sept. 28, 1823; died in Paris, Feb. 23, 1889; first exhibited in 1844 at the Salon of Paris, and afterward produced many paintings, the finest of which are in the Luxembourg collection. He was elected to the Académie des Beaux Arts in succession to Horace Vernet in 1863, and was an officer of the Legion of Honor. Among his principal works are *The Death of Moses* (now in the Corcoran Art Gallery at Washington); *The Lost Paradise; John the Baptist; Venus;* and *Lucretia and Tarquin*.

CABBAGE-BUTTERFLY, a name applied to several species of butterfly, especially to *Pieris brassicæ*, the larvæ of which devour the leaves of plants of the cabbage tribe. Their wings are white with little black marks; their antennæ short; their flight lazy and lumbering. In May and June they may be seen hovering over the cabbage and turnip beds to deposit their eggs; these are yellow, conical in shape and are deposited on the under side of the leaves in clusters of 20 or 30. They hatch in a week, and the resulting caterpillars grow to a length of one or one and a half inches. They suspend themselves by their tails, and are transformed into shining pale green chrysalids, spotted with black, from which the perfect insect emerges, either the same season or after the lapse of a winter, no longer to devour cabbage leaves, but to subsist delicately upon honey. To the same genus belong the rape-butterfly (*Pieris rapæ*) and the Southern cabbage-butterfly (*Pieris protodice*).

CABBAGE-FLY (*Anthomyia brassicæ*), a fly of the same family as the house-fly, whose larvæ often do great injury to the roots of cabbages and similar plants. They are found in America and Europe.

CABBAGE-MOTH, a moth or butterfly (*Mamestra brassicæ*). The wings are brown, marked with pairs of darker spots. The greenish black caterpillar feeds upon the leaves of the cabbage and allied plants. The name is also applied to the white or yellow butterflies of the genus *Pieris*, which have been introduced into America from Europe. The larvæ of the various species vary in color from green to black. They are known as "cabbage-worms," and are similar to the larvæ of *Mamestra* in habits.

CABBAGE-PALM OR CABBAGE TREE, a name given to several palms whose great terminal buds are eaten like cabbage. The *Oreodoxa* (formerly called *Areca oleracea*, or *Euterpe oleracea*) is the cabbage-palm of the West Indies. The *Sabal palmetto*, otherwise called the palmetto, is the cabage-palm of the Southern states. See PALM, Vol. XVIII, pp. 189–191.

CABER, TOSSING THE, a Scottish athletic exercise or feat, in which a long, peeled sapling or undressed stem of a young tree, heavier at one end than the other, is held perpendicularly balanced against the chest, small end downward, and tossed so as to fall on the heavy end and turn over, the farthest toss and straightest fall winning. The thin end, held in the hand, should be not more than three inches in diameter; the average length of a good larch caber is about 21 feet.

CABES OR KHABS, GULF OF, an inlet of the Mediterranean Sea, lying between the islands of Kerkenna and Jerba, on the northeast coast of Africa, in lat. 34° N., and long. from 10° to 11° E. The town of Cabes stands at the head of the gulf.

CABEZON DE LA SAL, a town of north-central Spain, in the province of Valladolid, 7 miles N.E. of Valladolid City. It is situated on the Pisuerga, and is celebrated as the scene of one of the first battles of the Peninsular campaign in 1808, in which the Spaniards were defeated by the French. Population, 2,000.

CABINDA, a small Portuguese territory on the west coast of Africa, delimited in 1886, bounded on the east by the Congo State, which on the south separates it from the mouth of the Congo. The capital, Cabinda, was formerly a noted slave port. See CABENDA, Vol. IV, p. 618.

CABINET, a body of advisers to the executive of a government. For European history and usage of, see CABINET, Vol. IV, pp. 618 et seq. In the United States the President's Cabinet exists as such simply by custom or precedent. The President is under no legal obligation to summon a Cabinet meeting, or to ask for an opinion, or to accept same if given, although no President has ever failed to call or to seek counsel from his Cabinet. The decisions of the Cabinet have no binding force. In 1886 it was provided by Congress that in case of vacancy of the offices of President and Vice-President by death, removal, resignation or disability, the members of the Cabinet should succeed to the office of President in the order of the dates of the original creation of their departments, beginning with the Secretary of State, then of the Treasury, of War, Attorney-General, Postmaster-General, Navy and Interior. The Secretary of Agriculture, whose department was created three years after the passage of this provision, is not affected by it. The successor is to act as chief executive until the disability is removed or a new President duly elected. See also UNITED STATES, Vol, XXIII, p. 748.

CABLE, GEORGE WASHINGTON, novelist; born in New Orleans, Louisiana, Oct. 12, 1844. Obliged by the death of his father, in 1859, to leave school, he became a clerk, and in 1863 enlisted in the Confederate army, fought gallantly, was wounded, and at the end of the war, finding himself destitute, became an errand-boy. He studied civil-engineering, and was for a time attached to a surveying expedition. During a period of ill health he began writing poems and humorous sketches for the New Orleans *Picayune*, and soon after was regularly attached to the editorial staff. On severing his connection with this paper, he became a contributor to *Scribner's Monthly*, now the *Century Magazine*. His stories deal with Creole life as found in the city of his birth. His published books include *Old Creole Days; The Grandissimes; Dr. Sevier; Madame Delphine; The Creoles of Louisiana; The Silent South;* and *Bonaventure*. The author has introduced a new field to the attention of readers. His stories are gracefully told, the characters are delicately drawn, and a sunny humor traces its way through them all. He is a popular lecturer, and gives most enjoyable readings from his own works. He is greatly interested in Sunday school work, and is a favorite writer and lecturer on the International Lessons.

GEORGE W. CABLE.

CABLE RAILWAYS. In a number of large cities the cable railway has been introduced to carry the street-car traffic because it was cheaper than horse-cars, and because, for some reason, electricity was not available. Its installation and maintenance are more costly than that of the trolley road, and yet it has advantages that cause its continuance in many cases. The extensive lines in New York City, on Broadway, on Third Avenue, and on One Hundred and Twenty-fifth Street, have been operated satisfactorily for several years. Philadelphia, after some years' use, abandoned them for the trolley. San Francisco has maintained a line for many years. The average cost of installing a cable railway system has been placed at $350,000 a mile, and the average of available horse-power at the cars at 40 per cent of the indicated horse-power of the engines used. This is not a remarkable showing, and the opinion prevails among engineers that the cable roads for city surface travel will be superseded within a few years by the underground or conduit-trolley system.

The cable railway seems destined, however, to find a permanent employment on mountain lines, or where there are severe grades to be overcome. It is peculiarly adapted to such work, and is now employed on most of the mountain railways of the world, often in conjunction with electricity. Three of these interesting roads have been built in the Alpine region, in close proximity to each other, since 1890; the Burgenstock railway, the Monte Salvatore railway, and the Stanserhorn railway. They were at first fitted with wire cables having hempen cores, which prevented the breaking of the wire strands by internal friction; but latterly the hempen cores have been subject to rot before the cables wore out, and it has been found possible to construct them wholly of steel wires, tightly packed, and of graduated section, without cross-winding. This arrangement almost wholly overcomes the tendency to wear out by internal rubbing of the wires in bending.

The Burgenstock railway, opposite Lucerne, is half a mile long, and has an inclination of 45 degrees. A rack is used as a safety factor. The cable speed is 2.5 miles an hour. The Monte Salvatore railway is almost a duplicate of this, both roads being driven by dynamos that obtain power from waterfalls.

The Stanserhorn railway is the most remarkable of the Alpine trio, having a grade of 60 per cent, and attaining an altitude of 6,233 feet, and dispensing altogether with the rack, depending upon a safety-brake for clutching the rails in case of accident to the cable. The power is brought from an electric-power station several miles away, the price paid being only $20 per horse-power per annum. A fall of the river Aa furnishes power for the dynamos. The road cost only $300,000, notwithstanding the tremendous grade, and that a part of its route had to be tunneled out of a loose mass of fallen boulders.

The Otis elevated cable railway at Catskill, New York, built in 1892, is 7,005 feet long, and has a rise of 1,602½ feet. Trains are made up of two cars each, and run on a double track, so that they balance each other by the ascent of one while the other descends. The cable is supported by pulleys at 30-

foot distances. The machinery is all controlled from an operating-tower by means of levers, one set admitting steam to the Hamilton-Corliss engines, another set reversing the engines, and another set operating the brakes. The passenger-cars seat 90 persons, and the speed made is nine miles per hour. The cost of equipping the road was $260,000.

A projected road at the Jungfrau, in the Alps, will be, perhaps, the most novel of any of the cable railways. Its grade is 45 degrees, and the entire route is to be tunneled, so that it will present the appearance of an inclined well. The tunnel is to be made circular, and the cars are surrounded by ring-like shields which fill the area of the tunnel in such manner that they may serve to compress the air in the tunnel. In case of a break to the cable, a powerful air-tight door at the bottom is closed automatically, and thus a cushion of air is introduced to break the force of the fall, which could not result in serious damage to the occupants of a car.

Much inventive ingenuity has been expended upon the mechanism of grips for cable-cars, the conditions under which they operate being very exacting. The supporting piece that goes through the slot must be very strong, though but five eighths of an inch thick. The hold must be taken on the cable gradually, and in such a manner as not to wear the outer strands, so that loose wires will project and catch the grips of cars that it is desired to stop. This last requirement is not wholly met, and runaways of cable-cars will continue until some improved device overcomes the difficulty.

CHARLES H. COCHRANE.

CABLE–WAYS. See ROPEWAYS, in these Supplements.

CABOT, GEORGE, statesman; born in Salem, Massachusetts, Dec. 3, 1751; died in Boston, April 18, 1823. At the age of 25 he was a member of the Massachusetts provincial congress, and in 1790 was elected to the United States Senate from Massachusetts. In 1814 he was president of the Hartford convention. He was an assistant of Alexander Hamilton in his financial schemes, and an authority on political economy.

CABOT, JAMES ELLIOTE, writer and editor; born in Boston, Massachusetts, June 18, 1821; in 1844 began writing for *The Dial;* in 1848–50 was editor of *Massachusetts Quarterly;* since then has written for the *Atlantic Monthly*, *North American Review*, and edited Emerson's works and *Audubon's Birds of America.* He published in 1887 a *Memoir of Ralph Waldo Emerson.*

CABRAL, PEDRO ALVAREZ, Portuguese explorer; born probably about 1460, and died about 1526; appointed by the king of Portugal to command a fleet for the East Indies, it was carried by currents to Brazil. An account of his landing there is given in BRAZIL, Vol. IV, pp. 227, 228. He set sail again and arrived in Calicut, India, with the loss of seven vessels. The last mention of him is in the account of his arrival home at Lisbon in 1501.

CABRERA, DON RAMON, Carlist leader; born at Tortosa, Catalonia, Spain, in 1810; died at Wentworth, near Staines, England, May 24, 1876. He was intended for the church, and had already received the minor orders, when the civil war broke out at the death of Ferdinand in 1833. He at once joined the partisans of Don Carlos, and by his energy and pitiless cruelty made his name a household word throughout Aragon and Valencia. Defeated and wounded at Rancon, he escaped with difficulty, but soon reappeared at the head of a formidable force, defeated the royal army in two engagements, and for a time threatened Madrid itself. In 1839 Don Carlos created him count of Morella, and governor-general of Aragon, Valencia and Murcia. He strongly opposed Don Carlos's abdication in 1845, and in 1848 renewed the struggle for absolutism in Spain; but the attempt proved an utter failure, and he was obliged to take refuge in France.

CACAO–BUTTER, a fixed oil expressed by heat and pressure from the fruit of *Theobroma cacao*, and largely used in pharmacy and in the preparation of cosmetics. The raw cacao-nut contains over 50 per cent of fat, or cacao-butter. See COCOA, Vol. VI, pp. 100 et seq.

CÁCERES, ANDRÉS AVELINO, Peruvian soldier; born in Huanta, April 12, 1838. He joined the army as second lieutenant in 1852. He assisted in the abolition of slavery under Castilla; won the rank of colonel; distinguished himself in the war with Chile; was made brigadier-general; and was instrumental in the overthrow of the Peruvian General Iglesias, who had established a government of his own at Cajamarca. Cáceres entered the capital in March, 1885, was elected President in December, and inaugurated in July, 1886. In 1891 he was sent as Peruvian minister to Spain and France.

CACERES, NUEVA, a town of the Philippines, in the province of South Camarines, on the island of Luzon. It is situated on the river Naga, or Santa Cruz, between the Bay of San Miguel and the Gulf of Rogay, about 175 miles S.E. of Manila. Population, 12,500.

CACHALOT OR SPERM–WHALE. See WHALE, Vol. XXIV, p. 525.

CACHE, a name given by travelers in Canada and the western part of the United States to places for concealing provisions and other articles for present convenience or future use. Usually the place of concealment is in the ground or under a cairn. The characteristic mounds of heaped-up stones in the arctic regions, along the lines of navigation, are also known by this name. They are constructed to leave a permanent deposit of food for navigators.

CACHET, LETTRES DE. See LETTRES DE CACHET, Vol. XIV, p. 484.

CACHEXIA, a name applied by physicians sometimes to a group of diseases, and sometimes to the constitutional state accompanying a particular disease, as the cancerous cachexia, gouty cachexia, etc. Cachexia has come to be chiefly employed with reference to diseases in which the general nutrition of the body is at fault, and in which the local disorders are supposed to be the result of a constitutional cause.

CACHICAMA OR TATOUPEBA, the nine-banded armadillo. See MAMMALIA, Vol. XV, p. 387.

CACHOLONG, a mineral, regarded as a variety

of opal, and sometimes called pearl opal, or mother-of-pearl opal. (See MINERALOGY, Vol. XVI, p. 390.) It has a flat, conchoidal fracture, and it is found united with common chalcedony.

CACIQUE OR CAZIQUE, the designation given to the chiefs of Indian tribes in the central and southern parts of America. The title was first applied by Spanish discoverers to the native princes whom they found reigning in Mexico, Peru, Haiti and Cuba, and was formed from a native Haitian word.

CACODYL, the fuming liquor of Cadet. See CHEMISTRY, Vol. V, p. 577.

CACOUNA, a village of Temiscouata County, northeast Quebec, beautifully situated on the right bank of the St. Lawrence, about 130 miles below the city of Quebec, on the Grand Trunk railroad. It is a favorite summer resort for fishing and hunting and for salt-water bathing. Population, 900.

CACTUS WREN, one of the wrens of the genus *Campylorhynchus*, which lives among the cactus in the southwestern United States, Mexico and Central America.

CADASTRAL SURVEYS, any large and complete land survey which includes the making of detail maps. Used in surveying property for the assessment of taxes. The usual scale for a cadastral map is two feet to the mile. The survey usually includes descriptive books, giving areas and names of property owners. Cadastral surveys were used in Italy as early as 1677.

CADDIS-FLY OR CADDICE-FLY. See INSECTS, Vol. XIII, p. 151.

CADDOAN INDIANS, the name of a group of North American Indians, for a time thought to be distinct, but later identified with the Pawnees. When first known, they occupied the Indian Territory, Arkansas, Kansas, Nebraska and North Dakota. At present located by tribes as follows: the Pawnees in the northern part of the Indian Territory and Oklahoma; the Wichita in the south of the Indian Territory; the Arikara on St. Berthold reservation, North Dakota; and several scattering remnants on the Kiowa and Comanche reservations in western Oklahoma. They number about 2,100 souls, of whom 530 are still bearing the name *Caddo*. See INDIANS, Vol. XII, p. 827.

CADE, JACK, leader of the insurrection of 1450, was by birth an Irishman. For a violation of law he was obliged to flee to France, and served for a time against England, but subsequently returned and settled in Kent as a physician. In June, 1450, assuming the name of Mortimer, and the title of Captain of Kent, he placed himself at the head of about 16,000 followers and marched on London, encamping on Blackheath, from which place he sent a paper to the king, demanding redress of certain grievances, and change of counselors. This demand was met by an army, before which Cade retreated to Sevenoaks; there he defeated a detachment and killed its two leaders. He entered London on July 2d, and for two days maintained strict order, though he forced the Lord Mayor to pass judgment on Lord Say, one of the king's detested favorites, and he was promptly executed by Cade's men. On the third day some houses were plundered, and that night the citizens held London Bridge against the insurgents. Dissensions arose among Cade's men; they dispersed, and a price was set upon his head. He attempted to escape, but was overtaken and killed on July 11th, near Heathfield, Sussex.

CADELLE, a name given in France to the larva of a beetle of the family *Trogositidæ*. It commits great ravages in granaries, and is often imported with grain into countries where it is not indigenous.

CADENCE, a musical term used to denote the finish of a phrase of which there are three principal species; namely, the whole, the half, and the interrupted cadence. The whole cadence, which finishes on the harmony of the tonic, is always used at the end of a composition, and is frequently called the final cadence. In its most perfect use it consists of three chords, the one before the final being always dominant. The half-cadence is used to mark the termination of an idea or phrase, like the colon and semicolon, showing a considerable division, but, at the same time, that a continuation is necessary. The harmony of the half-cadence is the reverse of the whole cadence, as it falls from the tonic to the dominant. In the interrupted cadence another harmony quite strange is introduced, so that the ear is deceived. The more particular the preparation for the usual cadence is made, the more strange and unexpected is the interruption, which can be made in so many ways, that Reicha, in his *Traité de Haute Composition Musicale*, gives 129 interrupted cadences. In rhetoric, cadence signifies the sinking or falling of the voice, and the modulation of the voice in general.

CADER IDRIS ("Chair of Idris," a reputed giant), a picturesque mountain in the county of Merioneth (q.v., Vol. XVI, p. 38), Wales, 5 miles S.W. of Dolgelly. It consists of an immense ridge of broken precipices, 10 miles long and 1 to 3 miles broad, the highest peak reaching an elevation of 2,914 feet. It is composed of basalt, porphyry and other trap rocks, with beds of slag and pumice. The view from the summit is very extensive, including the Wrekin, in Shropshire, and St. George's Channel almost to the Irish coast.

CADET, a term applied in a general sense to the younger son of a noble house, as distinguished from the elder. The military use of the word arose from the practice of providing for younger sons, or cadets, by making them officers of the army or navy. (See NAVY, Vol. XVII, p. 294.) In the United States a military cadet is one who is receiving instruction and military discipline at the military or naval academies (q.v., in these Supplements). As to British military cadets, see ARMY, Vol. II, p. 585; for naval cadets, see NAVY, Vol. XVII, p. 294.

CADI OR KÁDI, an Arabic word signifying a judge or person learned in the law. See MOHAMMEDANISM, Vol. XVI, pp. 590, 591.

CADILLAC, ANTOINE DE LA MOTHE, French colonial governor in America; born in Gascony, France, about 1660; died about 1717. He was a descendant of a noble family, and was ordered by Louis XIV to examine the coast defenses of the French territory in America. He was granted Mount

Desert island, off the coast of Maine, in 1691. He founded Detroit, Michigan, in 1701 (calling it Fort Pontchartrain), established trading-forts, discovered a silver-mine, which was named "La Mothe," and in 1711 became governor of Louisiana.

CADILLAC, a city, capital of Wexford County, northwest lower Michigan; on Clam River, about 100 miles N. of Grand Rapids, on the Ann Arbor and the Grand Rapids and Indiana railroads. It is the seat of an extensive trade in lumber, and contains numerous lumber-mills, machine-shops and foundries, and manufactories of bricks, cigars, carriages and wagons. Population 1894, 5,105.

CADIZ, a town, the capital of Trigg County, southwest Kentucky, 9 miles from the Cumberland River, 55 miles S.E. of Paducah. It has manufactures of wagons, plows and furniture. Population 1890, 890.

CADIZ, a town, the capital of Harrison County, central east Ohio, in a fertile, hilly district, about 20 miles N.W. of Wheeling, on the Pittsburg, Cincinnati, Chicago and St. Louis railroad. It is the center of an important wool-growing industry. In the vicinity are valuable mines of bituminous coal. Population, 1,716.

CADOUDAL, GEORGES, a Chouan leader; born in Auray, Brittany, Jan. 1, 1771; executed in Paris, June 25, 1804; the son of a miller; joined the royalist peasants and became their leader; was taken prisoner in 1794, but escaped from Brest; Bonaparte offered to make him lieutenant-general, which offer he refused; he entered into a conspiracy against Bonaparte, was taken prisoner, and executed. See CHOUANS, Vol. V, p. 687.

CADWALADER, GEORGE, soldier; born in Philadelphia, Pennsylvania, in 1804; died there, Feb. 3, 1879. He practiced law; served in the Mexican War as brigadier-general of volunteers; rose to be major-general on account of gallantry at Chapultepec, served as major-general of volunteers in 1862, and was a member of a commission appointed to revise the United States military laws and regulations.

CADWALADER, JOHN, an American general; born in Philadelphia, Pennsylvania, Jan. 17, 1742; died in Shrewsbury, Pennsylvania, Feb. 11, 1786. He was interested in public affairs prior to the Revlutionary War; was captain of a military company, and when the city battalions were formed, was placed in command of the "Silk Stocking Company." Promoted brigadier-general, he was placed in command of the Pennsylvania militia, assisted in the capture of the Hessians at Trenton, and was present at the battles of Brandywine, Germantown and Monmouth. He wounded Thomas Conway in a duel, brought about by the attacks of Conway on Washington. After the close of the war he removed to Maryland, and was elected to the state legislature.

CADY, ALBEMARLE, officer; born in New Hampshire about 1809, and graduated from West Point in 1829. He served chiefly at frontier posts until 1846, fought in the Mexican War from 1846 to 1848, and during the early part of the Civil War was on Pacific Coast duty. In 1864 he was appointed to the command of the drafting rendezvous in New Haven, Connecticut, was brevetted brigadier-general, and was soon after retired from service.

CÆCILIA, a genus of serpent-like amphibians (see AMPHIBIA, Vol. I, p. 751), the typical genus of the family *Cæciliidæ*. These are worm-like, without limbs and with small eyes, in correspondence with a subterranean mode of life. The cæcilians live in South America and the East Indies. Their food consists of worms and insect larvæ.

CÆCILIUS STATIUS, a Roman comic poet; date of birth unknown; died about 168 B.C.; a native of Milan. He was given the name Statius on account of his being a slave. His works that are preserved consist of but a few fragments. They were mainly free translations of Greek writers. He was classed by the Romans with Terence and Plautus. See DRAMA, Vol. VII, p. 411.

CÆCUM OR "BLIND" INTESTINE. See DIGESTIVE ORGANS, Vol. VII, p. 228.

CAEN STONE, a fine oölite stone for which the neighborhood of Caen, in Normandy, France, has long been celebrated. The quarries are subterranean, and the stone is brought up in blocks eight or nine feet long and two thick, through vertical shafts.

CÆSALPINIA, a genus of trees of the family *Leguminosæ*, the type of the suborder *Cæsalpinieæ*. This suborder contains about 1,500 known species, among which many are notable for their purgative properties, as senna; some produce eatable fruits, as the tamarind; some yield resinous and balsamic products, some produce important dyewoods, and some are trees of great size and very valuable for their timber. They are natives of the warm parts of Asia and America, although the "redbud" (*Cercis Canadensis*) and "honey-locust" (*Gleditschia triacantha*) are familiar representatives in the temperate parts of the United States. Tropical species of *Cæsalpinia* yield "sappan-wood," "Brazil-wood," "algarovilla," etc., used as dyewoods and in tanning. See DIVIDIVI, Vol. VII, p. 292.

CÆSAR, the title of the Roman emperors and of the heirs to the throne, was originally the name of a patrician family of the *Julia Gens*, one of the oldest in the Roman state, claiming to be descended from Iulus, the son of Æneas. Octavian bore the name as the adopted son of the great Julius Cæsar, and handed it down to his own adopted son, Tiberius, after whom it was borne by Caligula, Claudius and Nero. Although the Cæsarean family proper became extinct with Nero, the word *Cæsar* was part of the style of the succeeding emperors; usually between imperator and the personal name, as, "Imperator *Cæsar* Vespasianus Augustus." When the Emperor Hadrian adopted Ælius Verus (136), the latter was permitted to take the title of Cæsar; and from this time in the Western, and afterwards also in the Eastern, Empire it was borne by the heir apparent to the throne, while Augustus continued to be the exclusive name of the reigning emperor. The name reappears in the *Czar* (or *Tsar*) of Russia, in the *Kaiser* of the "Holy Roman Empire," and the modern empire of Germany, and the *Kaisar-i-Hind*, or Empress of Hindustan.

CÆSAREAN OPERATION OR HYSTERECTOMY, so called from the belief that Julius Cæsar

was brought into the world in this way. See SURGERY, Vol. XXII, p. 691.

CÆSIUM, a bluish-gray alkali metal. Chemical symbol, Cs. See POTASSIUM METALS, Vol. XIX, pp. 592, 593.

CAFFEIN OR THEINE ($C^8H^{10}N^4O^2$), the alkaloid or active principle of coffee and tea. When isolated it forms beautiful white crystals, with a silky luster, which are soluble in water, alcohol and ether. It was first discovered in 1820 by Runge in Germany, and by Pelletier and Caventou in France. It is present in coffee to the extent of about 1 per cent, and in ordinary tea, from 2½ to 6 per cent, and is also found in Paraguayan teas; in the former, about 1 per cent, and in the latter, which is a sort of chocolate, nearly 5 per cent. Caffein is thought to be present also in the beans of the coffee and other plants. It is used in medicine as a powerful stimulant in case of deficient circulation or respiration.

CAHAWBA, a navigable river of Alabama. It rises in the northern central part of the State, at the northeast corner of Jefferson County, flows southward through Jefferson, Shelby, Bibb and Perry counties, extending for about 200 miles, and enters the Alabama at the old village of Cahawba, 10 miles below Selma, in Dallas County.

CAHIR, a town in the county of Tipperary, south-central Ireland, on the Suir, beautifully situated on the east end of the valley, between the Galtees and Knockmealdown Mountains. Cahir Castle, an ancient irregular Norman structure of considerable extent, is situated on a rock on the left bank of the Suir. Cahir has extensive flour-mills. Population, about 2,500.

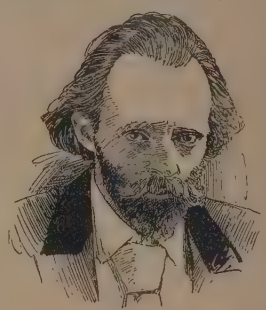
CAHOKIA, a village of St. Clair County, southwestern Illinois; so named from an extinct tribe of Indians; situated on the Mississippi, 4 miles from East St. Louis, on the Cairo and St. Louis railroad. It was settled by the French about 1682; and its present inhabitants, descendants of the original settlers, preserve many of the customs and traditions of their ancestors. In the neighborhood are found numerous prehistoric mounds. Some coal-mining is carrried on. Population, about 200.

CAICOS, CAYOS OR KEYS, a group of islands belonging geographically to the Bahamas, of which they form the two southeastern groups; annexed in 1874 to Jamaica. The governing power is supervised by the governor of Jamaica, and consists of a commissioner and a legislative board of five, all appointed by the British ruler. The group consists of 30 islands, only 6 of which are inhabited. The largest island is Grand Caicos, 6 miles wide by 20 long. The capital is on Grand Turk. Together with Turk's Islands, they have an area of 223 square miles. Salt-making, sponge-fishing and cultivation of sisal grass for hemp are the chief industries. Population 1891, 4,745,

CAILLIAND, FREDERIC, a French traveler; born at Nantes, June 9, 1787; died there, May 1, 1869. He became a goldsmith and traveled over Europe, and in 1815 went to Alexandria. In examining the mineral resources of Egypt he rediscovered the ancient emerald-mines of Zebal Zobara, near the Red Sea, and his report of a journey to Siwah led to its annexation by Egypt in 1820. In 1821–22 he accompanied Ibrahim Pasha's expedition to the White Nile, and his *Voyage à Néroé* (4 vols., Paris, 1823–26) contained the first trustworthy account of that district. In 1827 he became conservator of the Natural History Museum at Nantes. He published a *Voyage à Syouah*, and two volumes of researches on the life of the ancient Egyptians, Nubians and Ethiopians.

CAIN, WILLIAM, civil engineer; born in Hillsboro, North Carolina, May 14, 1847; professor of mathematics and civil engineering at the University of North Carolina; is a graduate of the North Carolina Military and Polytechnic Institute. Among his published writings are *Maximum Stresses in Framed Bridges; Symbolic Algebra;* and *Theory of Solid and Braced Arches.*

CAINE, THOMAS HENRY HALL, better known as "Hall Caine," British novelist and dramatist, was born of Manx parentage in 1853, and commenced his career as an architect in Liverpool. From contributing to both the *Builder* and the *Building News* he became connected with journalism, and joined the staff of the Liverpool *Mercury*. He resided with Dante Rossetti in London until the poet's death in 1882 later making his home on the Isle of Man; published *Sonnets of Three Centuries* (1882), and also *Recollections of Rossetti*, while in 1883 *Cobwebs of Criticism* appeared. During the last few years his skill as a novelist has been exemplified in *The Shadow of a Crime, A Son of Hagar* (1887); *The Deemster*, which was dramatized under the title of *Ben-My-Chree* (1887), *The Bondman* (1890), and *The Scapegoat*, which appeared in 1891. He published a book on the Manx nation in 1891. The *Manxman*, one of his best novels, appeared in 1894.



HALL CAINE.

CAINOZOIC PERIOD. See GEOLOGY, Vol. X, pp. 360–365.

CAIRD, EDWARD, author and teacher; was born at Greenock, Scotland, in 1835; educated at the University of Glasgow. From Glasgow he passed as a Snell exhibitioner to Balliol College, Oxford, and became in 1864 fellow and tutor at Merton. In 1866 he was appointed professor of moral philosophy at Glasgow University, and in 1893 he accepted the position of master of Balliol College, Oxford. Among his works are a *Critical Account of the Philosophy of Kant* (1877); an excellent little book on *Hegel*, in Blackwood's "Philosophical Classics;" an examination of *The Social Philosophy and Religion of Comte* (1885); and *Evolution of Religion* (1893).

CAIRD, SIR JAMES, British economist and agriculturist; born in Stranraer, Scotland, in 1816; died in London, Feb. 10, 1882; graduated from the University of Edinburgh; in 1849 made a report on the

famine in southwest Ireland and suggested measures for the relief of the agriculturists of that district; was elected to Parliament in 1857; was knighted in 1865; became privy councilor to the Board of Agriculture in 1889. He published several reports covering agricultural subjects in England, the United States and Ireland. He represented the government on many important commissions, among them the Indian Famine Commission. He is author of *English Agriculture* (1852), and *India: The Land and the People.*

CAIRD, JOHN, Scottish preacher; born at Greenock, Scotland, Dec. 15, 1820. He studied at the University of Glasgow, and was locally well known as an able preacher, when a sermon delivered before the Queen, in Crathie, in 1855, and published under the title of *The Religion of Common Life*, quickly carried his fame into all parts of the Protestant world. It was pronounced by Dean Stanley to be the greatest single sermon of the century. In 1858 Dr. Caird published a volume of sermons, marked by beauty of language, strong thought and intense sympathy with the spiritual aspirations of mankind. He received the degree of D.D. in 1860, was appointed professor of divinity in 1862, and in 1873 principal and vice-chancellor of Glasgow University. In 1880 he published *The Philosophy of Religion*, and in 1888 *Spinoza.* Died in Glasgow, July 30, 1898.

CAIRD, MRS. MONA, authoress; born in the Isle of Wight, at Ryde; gained a reputation chiefly by reason of her writing on marriage. Her published writings include *Whom Nature Leadeth; One That Wins; The Wing of Azraël;* contributions on *Marriage* and *Ideal Marriage* to the *Westminster Review;* to the *Daily Telegraph* on *Is Marriage a Failure?* and in the *Fortnightly* on *The Morality of Marriage.*

CAIRNS, HUGH MACCALMONT, LORD, statesman and lawyer; born near Belfast, Ireland, in 1819; died in Bournemouth, April 2, 1885; elected to Parliament in 1852; appointed Attorney-General in 1866. He became a leader of the Conservative party in the House of Lords, and was twice Lord Chancellor of England, first in 1868 and again from 1874 to 1880.

CAIRO, EGYPT. See AFRICA, in these Supplements.

CAIRO, a city, capital of Alexander County, southwest Illinois; situated on a low point of land at the junction of the Mississippi and Ohio rivers, and on the Cleveland, Cincinnati, Chicago and St. Louis, the Illinois Central and the Mobile and Ohio railroads. It was formerly subject to inundations, which retarded its growth, but extensive levees that have recently been erected at great expense afford ample protection against the encroachments of the rivers, and the city is now rapidly increasing in numbers and wealth. It is the entrepôt for southern markets of the products of Illinois, Wisconsin and Iowa. More than 4,000 steamboats enter and clear from its wharves every year. Population in 1880, 9,011; in 1890, 10,422.

CAITHNESS FLAGSTONES, dark-colored, bituminous schists, slightly micaceous and calcareous, valuable on account of their great toughness and durability for pavements. See GEOLOGY, Vol. X, p. 344.

CAJABAMBA, a town situated 102 miles S. of Quito, Chimborazo province, Ecuador, on the arid plateau of Topi, at an elevation of 9,480 feet. The first town of Riobamba, founded on this site in 1533, was in 1797 overwhelmed by an earthquake, in which 30,000 lives were lost.

CAJAMARCA. See CAXAMARCA, Vol. V, p. 279.

CALABASH OR GOURD TREE, a tree of the West Indies and the tropical parts of America, of the natural order *Bignoniaceæ*, suborder *Crescentiaceæ.* In height and size it resembles an apple tree; it has wedge-shaped leaves, large, whitish, fleshy flowers, and a gourd-like fruit, sometimes a foot in diameter. The wood of the tree is tough and flexible, and is well adapted for coach-making, but the most useful part is the hard shell of the fruit, which is used instead of bottles, goblets, cups, water-cans, etc. The calabashes are sometimes polished, carved, dyed, and otherwise ornamented. See also GOURD, Vol. XI, p. 4.

CALAIS, a city, capital of Washington County, northeast Maine, at the head of navigation on St. Croix River, opposite St. Stephen's, New Brunswick, 12 miles from Passamaquoddy Bay, 82 miles N.E. of Bangor. Its chief industry is ship-building, and there is an extensive export trade in lumber, which is sawn in the vicinity. There are also a number of machine-shops and foundries, the power for running which is furnished by the St. Croix River. Calais is the seat of Calais Academy. Population 1890, 7,290.

CALAMANDER-WOOD is an exceedingly hard and valuable cabinet wood of rich and varied colors, obtained from *Diospyros hirsuta* of southern Asia. Its near relative, *D. Ebeneum*, yields the well-known "ebony-wood," while the American representative is *D. Virginiana*, the "persimmon." The genus belongs to the family *Ebenaceæ.* See EBONY, Vol. VII, p. 619.

CALAMARY OR SQUID, a name applied to numerous forms of cuttle-fish, or *Cephalopoda.* See CUTTLE-FISH, Vol. VI, p. 735.

CALAMBUCO OR CALAMBOUR is a very durable timber tree of Luzon, somewhat resembling the teak, and much used in ship-building and in the manufacture of furniture and agricultural implements.

CALAMIANES, a group of islands in the Eastern Archipelago, in latitude about 11° 25′ to 12° 20′ N., and longitude 120° E.; between Palawan and Mindoro of the Philippines; area, 1,332 square miles. Calamian is the largest, being 15 miles wide and 35 long. See PHILIPPINES, Vol. XVIII, p. 752.

CALAMICHTUS, a genus of ganoid river fishes found in western Africa. It is called reed-fish because of its slender, cylindrical body.

CALAMINE, an ore consisting essentially of silicate of zinc. It occurs in small, obtuse-edged crystals, also compact and massive. See ZINC, Vol. XXIV, pp. 784, 785.

CALAMINT, a name given to species of *Calamintha*, a genus of the family *Labiatæ. Calamintha officinalis* is not infrequent in England. It has whorls of flowers on many-flowered stalks, and serrated leaves, with an agreeable aromatic odor, and is used to make herb-tea and as a pectoral medi-

cine. Common species of the United States are *C. Clinopodium*, "basil"; *C. Nepeta*, "basil-thyme"; and *C. glabella*. All are very fragrant herbs or shrubs.

CALAMITES, a group of fossil plants, which make their first appearance in the Devonian, occur abundantly in the Carboniferous, and seem to die out in the Permian strata. (See BOTANY, Vol. IV, p. 107.) There is some doubt as to the affinities of these plants; but they are generally admitted to be allied to the recent *Equisetaceæ*, or horsetails, from which, however, they differ in certain points. It has not yet been fully decided whether they should be considered as a peculiar form of *Equisetaceæ*, or classed as a distinct but allied order. The gigantic decorticated stem is longitudinally ribbed and transversely jointed; in some stems, long, narrow branchlets proceed from the transverse joints, and in others, branches bearing whorls of small branchlets or long, narrow, pointed leaves. Some of the species were provided with thick and others with thin bark. Calamites seem to have grown in dense brakes on low, alluvial flats, and perhaps even in water.

CALAMUS, the reed pen which the ancients used in writing. It was made of the stem of a reed growing in marshy places, of which the best were obtained from Egypt. The stem was first softened, then dried, and cut and split with a knife, as quill pens are made. Even now the Orientals write with a reed, which the Arabs call *Kalâm*. See PEN, Vol. XVIII, p. 483.

CALAMUS, a name with a variety of botanical applications: 1. The generic name of certain Asiatic species of *Palmaceæ*, or palms, with creeping or climbing stems, which furnish the commercial "cane," used in rattan canes, in bridge-building, for cables, for caning chairs, etc.; 2. The common name of the highly aromatic root-stock of *Acorus Calamus*, or "sweet-flag," of the family *Araceæ*, yielding the calamus-oil and acorin used in perfumery; 3. The common name of one of the sweet-scented grasses of India used in the manufacture of incense. See Vol. XII, p. 718.

CALANAS, a town of Andalusia, southwest Spain, situated about 27 miles N. of Huelva, and 13 miles N.E. of Tharsis, with which it was connected by rail in 1887. There is a large copper-mine in the vicinity. Population, about 10,000.

CALANCHA, ANTONIO DE LA, Peruvian Augustine monk; born in Chuquisaca, Peru, in 1584; died in Lima, March 1, 1654; held various offices in the church, the principal one being the rectorship of the college of San Ildefonso, at Lima. He is famous, however, on account of his one published writing, *Crónica Moralizada del Orden de San Agustin en el Peru*, an accurate account of the growth of his order in that district, and which is valued as a history of South America.

CALAND, PIETER, a Dutch engineer; born in Zierikzee in 1826; graduated at Breda, at the military academy; in 1845 became a director of the bureau of dikes and drains; in 1873 became chief inspector of that bureau; is a knight of the Order of the Netherlands Lion. His great work is the artificial approach to Rotterdam, rendering that port easily accessible. He is the author of several works on the protection of the coast of Holland against the sea.

CALANDO, in music, an Italian expression, meaning diminishing by degrees from *forte* to *piano*. It differs from *decrescendo* or *diminuendo*, as the *tempo* at the same time is slightly retarded, but not so much as in *ritardando*. The proper performance of the *calando* is purely a matter of good taste and feeling, depending on the performer.

CALANDRONE, a wind-instrument on which Italian peasants play simple melodies, and also sometimes accompany their national songs. It has the holes of a common flute, but the intonation is produced as in the common pipe.

CALATRAVA-LA-VIEGA, a ruined city of south-central Spain, situated on the Guadiana, 12 miles N.W. of Ciudad Real. In the middle ages it was a strongly fortified place, but nothing now remains except a single tower. The great battle with the Moors, fought here in 1158, gave rise to the formation of the order of Knights of Calatrava.

CALATRAVA, KNIGHTS OF, members of an order, founded just after the battle of Calatrava-la-Viega in 1158, fought between the Moors and Spaniards. It was sanctioned by the pope in 1164. The order was in connection with the Cistercian monks at first, but the knights separated from the monks, joining them again later. They were for a time all-powerful in Spain. Their military power was crushed in 1200 and Calatrava taken by the Moors. They regained some of their power in 1212. In 1489 the grand-mastership was transferred to the crown to prevent too much power falling to any other man. The present costume is a white mantle, with a red cross cut in the form of lilies upon the left breast. The cross of the order has the same symbol on a silver ground. Membership in the order is now conferred as a reward of merit.

CALBURGA, a town of the Nizam's dominions in Hindustan, 65 miles S.E. of Solapoor, and connected therewith by railway. It is situated on a tributary of the Beemah. It has been successively the capital of Hindu and Mohammedan sovereignties. Population, 6,000.

CALCAREOUS TUFA OR TUFA, a mineral which in its chemical composition is nearly identical with limestone and marble, but is distinguished by its spongy and cellular structure. It is generally soft, brittle and friable, but sometimes it is sufficiently hard to be used in building (see ROME, Vol. XX, p. 808). Sometimes it incrusts animal and vegetable remains, as in "petrifying springs" (see GEOLOGY, Vol. X, p. 270), and it is sometimes used as a filtering-stone. The stalactites and stalagmites found in caverns are varieties of calcareous tufa.

CALCASIEU, a river of Louisiana, about 230 miles long and navigable for 100 miles. It rises in the western part of the state, flows south through Lake Calcasieu, and enters the Gulf of Mexico near the village of Cameron, 90 miles from Galveston. An iron lighthouse 53 feet high stands at its mouth.

CALCEOLARIA, a South American genus of plants of the natural order *Scrophulariaceæ*. The calyx in this genus is four-partite, corolla two-lipped,

the lower lip remarkably inflated so as to form a bag, and the shape of the whole in some species resembles that of a slipper. The art of the gardener has succeeded in producing varieties and hybrids which exhibit many rich and delicate tints. Some of the species are used in South America for dyeing. See HORTICULTURE, Vol. XII, p. 262.

CALCIFEROUS EPOCH, an epoch in the Lower Silurian system of North America. The division is characterized by the presence of calcareous sandstones and limestones, portions of which are very hard and silicious, and contain geodes of quartz crystals. The Calciferous epoch immediately succeeds the Cambrian period.

CALCINATION OR CALCINING, the process of heating or roasting in furnaces the various metallic ores (see COPPER, Vol. VI, pp. 348–350) and of converting rock into cement by roasting. See CEMENTS, Vol. V, p. 328.

CALCITE. See MINERALOGY, Vol. XVI, p. 396.

CALCIUM, the metal present in chalk, stucco and other compounds of lime. See CHEMISTRY, Vol. V, pp. 525, 526.

CALCIUM CARBIDE. See ACETYLENE and CHEMISTRY, in these Supplements.

CALCULATING-MACHINES. Numerous crank-operating calculating-machines have been placed on the market for multiplying and dividing, and performing other arithmetical calculations. As a rule, they have several series of number-indexes, running from 0 to 9, with some form of pointers, adjustable by the crank. Among the best known of these are the machines of Thomas of France, which is manufactured in an improved form by Tate of England; Odhner of Poland; Baldwin of St. Louis; and Grant of Cambridge, Massachusetts. Grant's machine consisted of a cylinder bearing a set of rings on which are the numerals. These he terms adding-rings. A similar set of rings is placed on a shaft below, and these he terms registering-wheels. In order to multiply, the adding-rings are set to read the multiplicand, and the registering-wheels the multiplier. If the multiplicand were 387,432, the crank would be turned three times and a slide shifted, then eight times and a slide shifted, and so on. At the conclusion of the turning the answer could be read on the recording-wheels.

In 1889 Dorr E. Felt introduced a new form of calculating-machine, which has found large sale, and is used in Cornell University and other scientific institutions. It has a keyboard resembling that of a typewriter. The keys are numbered in two directions, from left to right and up and down. By striking the figures to be added, in the proper columns, the answer may be read at once. To multiply three figures by three figures, the operator has absolutely nothing else to do but to select three of the keys and strike them. This can be done in three seconds, as soon as one becomes familiar with the keyboard. The machine will also add, subtract, divide, square, and extract the cube root.

C. H. COCHRANE.

CALCULI, or stone in the bladder and gall-stone. See VESICAL DISEASES, Vol. XXIV, p. 189.

CALDECOTT, RANDOLPH, an English artist; born at Chester, March 22, 1846; died in St. Augustine, Florida, Feb. 12, 1886. He was for some time employed as clerk in a bank, first at Whitchurch, and afterward at Manchester. The success of his work in the London illustrated papers encouraged him to remove to the metropolis, where he soon proved himself without an equal in depicting the humors of animal life, and the joys of the country-house and the hunting-field. He contributed frequently to *Punch* and the *Graphic*, and occasionally exhibited at the Royal Academy, the Dudley and the Grosvenor galleries. In 1882 he became a member of the Institute of Painters in Water-Colors. His health, however, soon gave way, and after vain attempts to restore it by trips abroad, he died at St. Augustine. Randolph Caldecott will be remembered chiefly by the admirable *Caldecott's Picture Books*, which began in 1878 with *John Gilpin* and *The House That Jack Built.* He also illustrated Washington Irving's *Old Christmas* (1875); *Bracebridge Hall* (1877); Mrs. Comyns Carr's *North Italian Folk* (1878); and several other well-known works.

CALDERWOOD, HENRY, Scotch theologian and writer; born in Peebles, Scotland, May 10, 1830; was graduated at Edinburgh University and United Presbyterian Theological Hall; entered the ministry of the United Presbyterian Church, being chosen pastor at Glasgow of the Greyfriars Church; became professor of moral philosophy in Edinburgh University in 1868. He has written a number of valuable works, among which are *Handbook of Moral Philosophy; Relations of Mind and Brain;* and *Evolution and Man's Place in Nature.*

CALDIERO, a decayed town of North Italy, about nine miles E. of Verona. Its thermal springs were in repute as early as the first century of the Christian era, and continued to enjoy popularity until the sixteenth century, after which they gradually became neglected, and are now little visited. On the heights of Caldiero, in 1805, the Archduke Charles of Austria repulsed the French under Messéna, after a desperate engagement lasting nearly two days.

CALDER, a river of Yorkshire, West Riding. It rises in a marsh on the borders of Lancashire, near Burnley, and after a course of 40 miles joins the Aire near Pontefract. It forms a considerable portion of the canal route through Yorkshire and Lancashire, between the east and the west coasts of England.

CALDERON, FRANCISCO GARCIA, Peruvian statesman; born in Arequipa, Peru, in 1834; elected to the Congress in 1867; Minister of the Treasury in 1868; elected President in 1881; was taken prisoner by Chile; released in 1886, and made president of the Senate. *A Dictionary of Peruvian Legislation* (2 vols.) is his only published work that is known.

CALDERON, PHILIP HERMOGENES, painter; born of Spanish parentage, at Poitiers, France, in 1833. He studied in London and Paris, and regularly contributed to the Royal Academy from 1853, his subjects being chiefly historical or imaginative. He exhibited at the Paris international exhibitions of 1867 and 1878, receiving at the former the first

medal awarded to English art, and at the latter a first-class medal and the Legion of Honor. In 1887 he was appointed keeper of the Royal Academy. Among his paintings are *After the Battle; The Siesta;* and *Day of the Massacre of St. Bartholomew.* Died in London, May 1, 1898.

CALDERON, Serafin Estebanez de, a Spanish poet and novelist; born in Malaga in 1801; died at Madrid, Feb. 7, 1867. He was educated at the University of Granada, and in 1822 appointed as professor of *belles-lettres* and rhetoric at Granada. In 1837 he was governor of Seville. See Spain, Vol. XXII, p. 361, for a critique of his writings.

CALDWELL, a city of Sumner County, southern Kansas, about 20 miles S. of Wellington, on the Atchison, Topeka and Santa Fé, the Chicago, Rock Island and Pacific, and the St. Louis and San Francisco railroads. It is the trade center of a fertile agricultural district, and contains a number of grain-elevators and flouring-mills. Population, 1,448.

CALDWELL or LAKE GEORGE, a village, the capital of Warren County, central eastern New York, situated near the head of Lake George, about 60 miles from Albany, on the Delaware and Hudson railroad. It is a very popular summer resort. Its surroundings are picturesque and romantic; the lake is studded with numerous beautiful islets; and in the vicinity are several places of historic interest, including Fort George and Fort William Henry. The name Horicon, commonly supposed to be the original Indian name of the lake, was a fanciful invention of Cooper, the novelist. Population 1890, 1,377.

CALDWELL, a town, the capital of Noble County, southeast Ohio, situated about 30 miles E. of Zanesville and 35 miles N. of Marietta, on the Bellaire, Zanesville and Cincinnati and the Cleveland and Marietta railroads. It has a sash and door factory, and in the vicinity are found coal, iron, oil and salt. Population 1890, 1,248.

CALDWELL, a town, the capital of Burleson County, central Texas; 66 miles N.E. of Austin; on the Gulf, Colorado and Santa Fé railroad. A Normal Institute is located here. Population 1890, 1,250.

CALDWELL, Charles Henry Bromedge, an American naval officer; born in Hingham, Massachusetts, June 11, 1823; died in Waltham, Massachusetts, Nov. 30, 1877. He entered the navy as midshipman in1838, and became lieutenant in 1852. He commanded the *Itasca* in 1862, when an attack was made on Forts Jackson and St. Philip, and led a party of men who cleared away the chain obstruction which prevented the Union gunboats from passing the forts. Lieutenant Caldwell was in the action at Grand Gulf in 1862, and was soon afterward made commander. He subsequently commanded the *Essex*, the *Glaucus* and the *R. R. Cuyler*, and in 1874 was promoted to the rank of commodore.

CALDWELL, Howard H., poet; born at Newbury, South Carolina, in 1831; has contributed largely to periodicals, and published two volumes of poems, *Oliatta and other Poems* and *Poems*.

CALDWELL, James, American patriot and clergyman; born in Charlotte County, Virginia, in April, 1734; shot by a sentry, near Elizabeth, New Jersey, Nov. 24, 1781. He was a graduate of Princeton in 1759, and became pastor of a Presbyterian church in Elizabeth, three years later. During the agitation preceding the Revolution he was active in arousing the spirit of rebellion, and was subsequently chaplain in the American army. A monument commemorating his life and service was erected at Elizabeth in 1846. He was known as the "Fighting Parson," and to him is credited the saying, "Now put Watts into them, boys," as he had supplied his men with hymnbooks to use for gun-wadding.

CALDWELL, Joseph, educator; born in Lamington, New Jersey, April 21, 1773; died at Chapel Hill, North Carolina, Jan. 24, 1835. He graduated at Princeton in 1791, taught school in his native place and also in Elizabeth, and in 1796 was appointed to the chair of mathematics in the University of North Carolina. Thereafter he devoted his energies to the upbuilding of that institution, and to him is due the merit of having saved it from ruin. In 1804 Dr. Caldwell became president of the university, which position he occupied until his death, with the exception of the years 1812–17.

CALDWELL, Merritt, educator; born in Hebron, Oxford County, Maine, Nov. 29, 1806; died in Portland, June 6, 1848. He graduated at Bowdoin in 1828, and in the same year became principal of the Maine Wesleyan Seminary. In 1834 he was elected professor of mathematics at Dickinson College, Pennsylvania, and in 1837 was transferred to the chair of metaphysics and English literature, which position he occupied until his death. Among his published works are *The Doctrine of the English Verb; Philosophy of Christian Perfection;* and *Christianity Tested by Eminent Men.*

CALDWELL, Samuel Lunt, educator; born in Newburyport, Massachusetts, Nov. 13, 1820; died at Providence, Rhode Island, Sept. 26, 1889. He was educated at Colby University, Waterville, Maine. He subsequently graduated at the Newton Theological Institute, and became pastor of a Baptist church at Bangor, Maine, and afterward at Providence, Rhode Island. He held a professorship in Newton Theological Institue, and in 1878 was called to the presidency of Vassar College; this position he resigned in 1885. He published sermons, orations and lectures, and edited volumes 3 and 4 of *Publications of the Narragansett Club.*

CALEDONIA, a village, the capital of Houston County, southeast Minnesota, situated about 32 miles S. of Winona, on the Chicago, Milwaukee and St. Paul railroad. It contains manufactories of wagons and sleighs, and is the center of an important local trade, and the seat of Caledonia Academy. Population 1895, 1,045.

CALEDONIA, a village, the capital of Traill County, central eastern North Dakota, situated at the confluence of Goose River with the Red River of the North. It is an important shipping-point for grain on river steamers. Population 1890, 267.

CALEDONIAN CANAL. See Canal, Vol. IV, p. 787.

CALEDONIA SPRINGS, a village of Prescott County, Ontario, Canada, about 10 miles S. of L'Original. It contains a number of alkaline medicinal springs, noted for their efficacy in the cure of rheumatic and cutaneous diseases. Population 1890, 100.

CALENDER OR KALENDAR, a Persian word (meaning "greater") applied to members of an order of dervishes founded in the fourteenth century. The Calenders are wandering preachers, who hold that sin defiles the body only, and can be removed by ablutions. The members of the order, even during the lifetime of its founder, were remarkable for licentiousness and debauchery. See also GUILD, Vol. XI, p. 260.

CALENDS, the first day of each Roman month. See CALENDAR, Vol. IV, p. 665.

CALENTURE, an obsolescent term for a species of temporary fever occurring on board ship in hot climates, and probably due to the effect of exposure to the direct rays of the sun.

CALFA, AMBROISE, known to some as INSUF BEV, Armenian historian and scholar; born in Constantinople, March 2, 1830; joined the Mekhitarists and was educated by that order in Venice. Upon the completion of his studies there in 1848, he was sent to the Mekhitarist college, Murat, in Paris, being given a position in the faculty. In 1854 he retired to become the organizer of a school at Grenelle. This he left in 1857, on account of ill health, after which time he devoted himself to translation and to historical writing. These works include a *Universal History*, *Guide to Conversation*, an *Armenian-French Dictionary*, etc.

CALFA, CORÈNE, Armenian writer and scholar; brother of the preceding; born in Constantinople in 1835; educated by the Mekhitarists in Venice; editor-in-chief of the journal *Polyhistore;* followed his brother to Paris and became an instructor at the Murat College; soon took a high rank among the Armenian clergymen; was made bishop, and in 1875 archbishop. He published a book of poems under the title *La Colombe du Massis*, and later published an *Armenian Grammar;* a *History of Armenia;* a treatise on the *French Language, for the Use of Armenians*, and *Lectures on Religion.*

CALGARY, a town of the Alberta district, Northwest Territory of Canada; on the Canadian Pacific railway, 840 miles W. of Winnipeg. It stands 3,380 feet above the sea-level, in a broad valley between the Bow and Elbow rivers, and is a trading center for a wide district. It dates from 1884. Population 1891, 3,876.

CALHOUN, a town, the capital of Gordon County, northwest Georgia; 78 miles N.W. of Atlanta; on the Western and Atlantic railroad. A rich farming region surrounds it, and brick manufactories and a planing-mill are located here. Population 1890, 680.

CALHOUN, a town, capital of McLean County, western Kentucky, on the Green River, 65 miles N.W. of Bowling Green; the river is navigable the year around. Population 1890, 637.

CALI, SANTIAGO DE, a city of the Cauca state, Colombia, South America, situated on a tributary of the Rio Cauca, 3,300 feet above the sea. It is the most important city in Cauca. It is connected with Buenaventura by rail, and has considerable trade with that port. Population, 13,000.

CALIANO, a small town of the Austrian Tyrol, on the left bank of the Adige, about 9 miles S. of Trent. It figures in history as the place where the Austrian Archduke Sigismund won a signal victory over the Venetians in 1487. Being a place of considerable military importance, it was also contested in the campaigns of 1797 and 1809.

CALIBER OR CALIBRE, a technical name for the diameter of the bore of a firearm, whether a piece of ordnance or a small arm. If the weapon is rifled, its caliber is measured, not from the bottom of the grooves, but from the smooth surface between them, technically called the "bands." In the United States the caliber of a firearm is expressed in decimal parts of an inch; thus what is commonly called a 44-caliber rifle is one of 44-inch. The caliber of a cannon is expressed either by the diameter of its bore or by the weight of a solid round shot which it will carry. In Great Britain caliber is expressed as in the United States, with the exception of the heavy guns, which are denominated from their weight; as, a 38-ton gun, or a 100-ton gun.

CALICO–BASS, the common grass bass (*Pomonys sparoides*). It is found in the United States from the Great Lakes to the Gulf, and is prized as a game and food fish.

CALIFORNIA, a city, the capital of Moniteau County, central Missouri; in the midst of a rich agricultural and mineral-producing district; on the Missouri Pacific railroad. It contains a number of mills for the manufacture of flour, paper and woolen goods. Population 1890, 1,772.

CALIFORNIA, a borough of Washington County, southwest Pennsylvania; on the Monongahela River, 50 miles S.W. of Pittsburg; on the Reading and Southwestern railroad; steamboats ply between it and Pittsburg; the Southwestern Normal School is located here. Population 1890, 1,024.

CALIFORNIA embraces within the boundary of the state proper an area of 153,600 square miles, which confronts the Pacific Ocean along a coast-line more than 700 miles in length, and extending through nine and one half degrees of latitude. The

STATE SEAL OF CALIFORNIA.

state has an average breadth of about two hundred miles. In addition to this territory of 98,304,000 acres, California also includes 4,760 square miles of lakes, islands, bays, navigable rivers, salt marsh and tide-lands, making the total area 158,360 square miles, or 101,350,400 acres. California is second among the states in size, and comprises 4.4 per cent of the entire area of the United States, and is greater in extent than the combined states of Connecticut,

Delaware, New Hampshire, New Jersey, New York, Massachusetts, Maine, Rhode Island, Ohio and Vermont. The state is made up of mountain and valley land of great diversity of features. Two great mountain ranges traverse it from northwest to southeast—the Sierra Nevada, or Snowy Mountains, in the eastern and the Coast Range in the western part of the state. In the north these two ranges join indistinguishably, and in the south again, in the neighborhood of the Tejon pass, they become united into one chain, the San Bernardino Range. These two ranges have many branches, the most important being the San Diablo, Palo Scrito, Santa Lucia, San Rafael and Santa Inez mountains. Besides the numerous fertile valleys contained between their spurs and lateral ranges, their foothills inclose the great central valley of California. The eastern crest of the Sierras rises from 6,800 to 15,000 feet, and the western crest from one single tide-level gap at Carquinez Straits to elevations of from 900 to 9,000 feet. The highest peaks of the Sierra Nevada are Mt. Whitney, 14,898 feet high, at the south terminus, and Mt. Shasta, 14,442 feet high, at the north terminus. Mt. Whitney is the highest point of land within the United States, and within seventy miles is Death Valley, the lowest. Between Mt. Whitney and Mt. Shasta lie, in succession from north to south, Lassen's Peak, 10,577 feet; Castle Peak, 12,500 feet; Mt. Tyndall, 14,386 feet; Mt. Brewer, 13,886 feet; and Mt. Dana, 13,227 feet. The Coast Range is of much less altitude, varying from 4,000 feet in the north to 8,000 in the south end. (See Vol. IV, p. 697.) The northern part of the state is entirely covered by the interlocking spurs of the two ranges, which gives it a very rugged character. The south part is traversed by numerous broken ranges, and is extremely sterile, owing to the lack of water. A narrow belt along the coast of this southern portion is very fertile, greatly favored in respect to climate, and possesses much beautiful scenery. The most of the coast-line of the state is rocky, and good harbors are few. The Bay of San Francisco forms one of the best and most capacious harbors on the west coast of North America, and one of the finest in the world. It is nearly fifty miles in length, with a breadth averaging nine miles, with good anchorage, deep water and perfect shelter on all sides. Its entrance is a strait about five miles long and one mile wide, inclosed between high cliffs, and called the Golden Gate. Within the bay are numerous islands, among which is Mare Island, used as a navy-yard by the government. Humboldt Bay, on the north coast, is the best harbor in that part of the state. Southward from San Francisco are the bays of Santa Cruz, Monterey, San Luis Obispo, San Pedro and San Diego, of which the last, at the extreme south end of the coast, is next to San Francisco Bay, both for security and for advantageous geographical position. Of the islands off the coast, the rocky group called the Farallones, opposite the Golden Gate, have been the favorite resort for seafowl, whose eggs are collected there in great quantities. Off the south coast are several much larger mountainous islands, occupied as grazing-lands for large flocks of sheep; the largest one, Santa Catalina, furnishing several varieties of marble, valuable cement rocks and some metalliferous ores.

The principal rivers of the state are the Sacramento and the San Joaquin, the courses of both of which lie in the great central valley mentioned. The Sacramento rises in Mt. Shasta and flows south; the San Joaquin rises in the Tulare Lake, in the south end of the valley, and flows north. Near latitude 38° these rivers unite and flow west into the San Francisco Bay. Both have many small tributaries. The Sacramento, 370 miles long, is navigable for 120 miles from San Francisco; the San Joaquin, 350 miles long, is navigable for steamers for about the same distance. In the north, the Klamath River, which has its source in Oregon, flows west into the Pacific. The Colorado, which forms the southeast boundary of the state, is navigable for more than 500 miles from its mouth. Of the numerous rivers of the Coast Range, only one, the Salinas, flowing into the Bay of Monterey, is navigable. California has several large lakes, the principal one of which, Tulare, is at the southern end of the central valley. It receives King, Kern, White and Tule rivers. Upon the east slope of the Sierra are several large lakes, among them being Klamath, Goose, Honey and Owens, and other small lakes, many of which are alkaline and without outlet. Lake Tahoe, at the angle in the boundary between California and Nevada, is a beautiful body of pure water, about 20 miles long and averaging 1,500 feet in depth. It is one of the most elevated lakes on the continent. In the southeast there are many deep depressions, formerly lakes, similar to the noted Death Valley, which is 400 feet below the sea, and is a waterless, barren desert.

California has a great variety of climates, the wide range of temperature and climatic variations being due to differences in elevation and latitude and distance from the sea. These differences extend from the arctic temperature of 15,000 feet above to the semi-torrid climate of 400 feet below the sea-level. In 1895 the highest temperature recorded in the state was 124°, the lowest 23° below zero—an absolute range of 147°. The water of the ocean remains very equable, as regards temperature, throughout the year, varying but little from 52° to 54°. At San Francisco the freezing-point is not reached for entire years at a time, and a record of 17 consecutive years shows that but for 6 days of the time did the thermometer register 90°. The mean temperature of the coldest months, December and January, is 50°; that of the warmest month, September, 60°; the yearly mean, 55°. The normal annual temperature for the state is 60.1°. In the interior the climate varies indefinitely, every valley having a climate of its own. Sudden fluctuations of temperature are unknown throughout the state. The Colorado desert, in the southeast corner of the state, has a climate extremely hot and dry, and Fort Yuma is probably the hottest place in the United States. The warm and dry air of portions of southern California, where roses bloom every month of the year, is healthful and favorable to invalids, particularly consumptives. Monterey, San Diego, San Bernardino, Los Angeles and Santa Barbara have become winter sanatoriums,

famed throughout the world. The death rate per thousand in 1894 was 9.71, which, while very low as compared with other states, is still not a fair comparison, as so many invalids in the last stages of pulmonary diseases come into the state too late to be benefited, and add materially to the death rate. The northern part of the state, latitude 42°, is just within the extreme summer limit of the north temperate rain-belt. This limit in winter shifts a little south of the southern end of the state, and thus California has the full benefit of the winter rains and enjoys a summer comparatively rainless. The mean annual precipitation in the northwestern part of the state, and upon the exposed flanks of the Sierras and Coast Range is from 80 to 100 inches, while in the southeastern part there are comparatively rainless areas, receiving but from 2 to 4 inches annually. At San Diego and Monterey but 10 inches on an average fall, while at San Francisco the mean is close to 21 inches. Between these extremes of from 80 to 100 inches, and 2 to 4 inches, there lies every degree of average annual moisture. The rains are sudden and showery, as in the tropics, but thunder-storms are almost unknown. December is the month of greatest rain. Snow is rare, except in the Sierras, and hail falls only occasionally.

The distribution and variety of vegetation over an area of such extreme range of climatic and moisture conditions is marvelous and comprehensive. The cone-bearing trees excel in size and variety any other known area. The drier portions present a wealth of palm, cactus and yucca that bewilders the botanist. In sections the forest growth is sometimes so dense that more than a million feet of lumber can be cut from a single acre, while other areas are absolutely devoid of vegetation. Between extremes of such scope are found vegetations of every class and kind.

The agricultural products of California are many and varied, and agriculture is now the chief occupation of the people, as mining once was. The farming-lands of the state are estimated to cover an area of nearly 22,000,000 acres, of a value of about $700,000,000, producing about 4 per cent of the farm products of the United States. The growth of the cereals is extensive, and stands first in importance among the products of the soil. In the raising of wheat the state stands second. The yield in 1893 was 36,158,000 bushels, but by reason of the low price of that staple it did not bring as much as the crop of some former years, notably 1882, when the wheat harvest brought $43,000,000. The 93,945 acres planted to corn in 1895 produced 2,556,500 bushels, scarcely sufficient for home consumption; 111,367 acres sown to oats brought 3,160,661 bushels in the season of 1894; and the same year, 1,671,998 acres in barley gave a return of 22,913,617 bushels. Of this latter cereal California raises almost 30 per cent of the entire crop of the United States, standing first, and, with New York, producing about one half of the whole amount raised in this country. In the production of beans California stands second, raising near 1,000,000 bushels annually, which constitutes about 23 per cent of the entire crop. For 1894 the crop of hops amounted to 8,658,962 pounds, bringing to the growers $1,561,617, and being fully 17 per cent of the product of the states and territories. Other crops are hay, rye, broom corn, tobacco, cotton, sugar-cane, sorghum, alfalfa, millet and hemp. The state stands foremost in the production of the leading fruits and vegetables, raising especially fine peaches, apples, pears, grapes, plums, prunes, apricots, nectarines, cherries, figs, olives, oranges, lemons, quinces, limes, pomegranates, pomelos, persimmons, citron, bananas, guava, mulberries, raspberries, strawberries, blackberries, etc. In the growing of nuts the state stands first, raising and exporting large quantities of almonds, chestnuts, English walnuts, pecans, peanuts and filberts, which, from their excellent quality, find a ready market. California stands first in the production of grapes, having over 300,000 acres planted to vineyards, producing over 60 per cent of the wine made in the United States, and furnishing all of the raisins grown. The wine and brandy exported in 1895 amounted in value to almost $7,000,000.

Beets, carrots, cabbages, cauliflower, celery, lettuce, melons, onions, parsnips, peas, potatoes, radishes, tomatoes and turnips are among the leading vegetables shipped to places with less favorable climate. Canaigre is raised for use in tanning leather, and licorice-root is being extensively cultivated, both proving profitable industries. Olives are raised for the purpose of the extraction of the oil, as well as for pickling, and the purity of the olive-oil produced has gained for it a demand greater than the supply. In the production of beet sugar the state stands first, furnishing 80 per cent of the entire amount made in the United States. The amount of this commodity produced in the crop season of 1893–94 was in excess of 42,000,000 pounds, bringing the sum of $2,046,520. (See BEET SUGAR, in these Supplements.)

Stock-raising is a profitable industry, as is dairy-farming, the climatic conditions being favorable to both. Nowhere else does live-stock multiply more rapidly and mature earlier without shelter or cultivated food than in the valleys of California. This is particularly true of the country west of the Sierra Nevadas, where the mildness of the winters is very favorable to every branch of stock-raising. Horses, cattle, sheep, swine, and Angora goats are all extensively raised, and the state is the home of some of the finest and highest-priced animals of the above kinds in the world. The state stands third in the number of sheep, and second in the amount of wool produced, the clip of 1894 being 30,000,000 pounds. Much attention is given to apiculture, and the honey produced amounts to about 10 per cent of the entire amount marketed in this country.

The mineral resources of California are varied and of much importance. The production of gold, in which the state stands first, shows that California produced 38 per cent of the gold mined in the United States. The production of the precious metal for 1895 amounted to $15,334,317.69, and estimates of the amount mined since its discovery in 1849 place its value at $1,269,049,711. The silver annually produced has also a large value. Quick silver, mined nowhere else on this continent, yields

a large annual return, that for 1885 being $1,337,131. Platinum, produced nowhere else in the United States, yields a large return, and the mining is constantly increasing. Borax, found only in California and Nevada, gives an annual yield of great value, that of 1894 being $807,800. This was the sole production of the United States, the Nevada mines not being worked. Asphaltum is found in large quantities, and the state furnishes 93 per cent of the amount produced in the United States. Macadam rock and rubble-stone are both largely quarried, and yield a handsome return from exports, as does clay for brick and pottery, these three products yielding a million and a half dollars annually, in addition to the amount consumed at home. Excellent granite, salt, limestone and bituminous rock are also largely shipped, as are antimony, asbestos, chrome, copper, gypsum, lead, magnesite, marble, mineral paint, onyx, paving-blocks and slate. The only deposits of chromic iron in the United States are found in California. In 1895 the production was valued at $16,795, and the mining of this valuable mineral is constantly increasing. Iron ore is found in some localities, but the little coal that is mined is of indifferent quality, and not only does the lack of proper fuel retard the iron industry, but seriously impedes other manufacturing enterprises. New fields are in course of development, and coal of better quality than that heretofore found is coming into the manufacturing centers. Mineral waters, natural gas and petroleum are other important substances in the realm of mineral industry, the last named being produced in large quantities, and new fields being from time to time developed. In the summer of 1896 excellent wells were discovered in Fresno County, nine miles north of Coalinga. Petroleum has afforded the southern part of the state a very cheap fuel, and has caused a number of mines and factories to be operated which would otherwise have remained idle. The petroleum product in 1894 amounted to $1,064,521, and in 1895 the production was increased 50 per cent, but the value was much decreased.

California has an abundant water-power, the configuration of the country making its utilization cheap, and the transmission of electricity from points of generation easy. It is estimated that the water-power available for the development of electrical energy is amply sufficient to furnish the power to drive every kind of machinery within the state. Among the manufactures of the state are mining and agricultural machinery, lumber, leather, woolen goods, flour, silk, sugar, chemicals, etc. The census of 1890 shows about 8,000 establishments in operation, with an aggregate capitalization of almost $150,000,000, employing 83,000 operatives and paying $51,000,000 for annual wages.

The forest trees of California are of numerous species, some of which, as the mammoth, or big tree, and the Monterey cypress, occur nowhere else out of the state (see Vol. IV, p. 704). The narrow belt of redwood which covers the west slope of the Coast Range is very productive, and no other great body of timber in North America is so accessible and so easily worked. Single trees afford as much as 75,000 feet of lumber, and a yield of from 1,000,000 to 2,000,000 feet per acre is by no means rare. Other varieties of timber are ash, beech, black live-oak, English oak, black oak, white oak, blue oak, cedar, elm, sycamore, hemlock, locust, maple, walnut, willow and poplar. Considerable amounts of lumber are shipped to all parts of the world, much being sent to seaports in Europe, Australia and South America. In 1894 over 300,000,000 feet were handled at the single port of San Francisco.

In 1891 the value of all goods imported into California was $51,481,365, the value of the exports $40,563,595, making a total of $92,044,960, about 5 per cent of the total imports and exports of the United States.

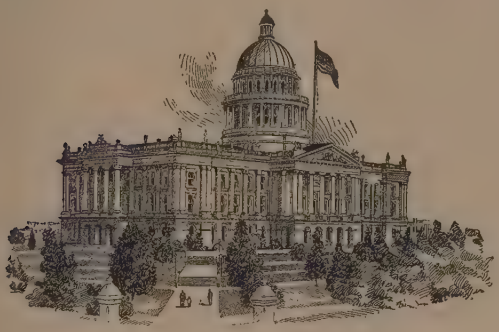
One of the greatest points of interest in the state is the beautiful Yosemite Valley. (See Vol. IV, p. 698.) Near the Yosemite Valley, and in the same county, is the Mariposa Big Tree Grove, containing about 500 of these mammoth trees (*Sequoia gigantea*). (See Vol. IV, p. 704). June 30, 1864, Congress passed an act donating the Yosemite Valley and the Mariposa Big Tree Grove to the state of California, to be held for public use, resort and recreation, inalienable for all time. A commission was appointed by the governor, and it, with its successors, have expended considerably in excess of $300,000 in making all points accessible to the public, in preserving and protecting the natural scenery and in general improvements. The grant of the Yosemite Valley was described as "the cleft or gorge in the Granite Peak of the Sierra Nevada Mountains, . . . with its branches and spurs, in estimated length 15 miles, and in average width one mile back from the main edge of the precipice on each side of the valley." The grant of the Big Tree Grove embraced less than the area of four sections of land, or about 2,500 acres.

The grizzly, black and brown bear now are scarcely found except in the mountain fastnesses. Seven species of the fox are known, and in the high Sierras the fisher and American sable, or marten, are found. Sea-lions frequent the rocks and islands near the seashore, and fur-seals occasionally appear at the Farallones. The California otter, and sea-otter, cougar, jaguar, lynx, gray wolf, coyote, skunk and wolverine are natives of the state, and the beaver and gray ground-squirrel are very common. The elk is still found in the forests of the north counties, and there are several varieties of deer, the black-tail being the most common. Antelopes are being rapidly exterminated. The mountain-sheep, or "bighorn," is found in the mountains of the Sierra Nevada. All the birds common to temperate climate are well represented, there being 350 species native to the state. Grouse and quails, or partridges, geese and ducks abound. The state is well supplied with fish, and a large business is done in the exportation of dried and canned fish of several kinds. The product in 1890 was valued at $4,463,369, furnishing employment for over 5,000 persons. The oyster industry is a considerable one, amounting to about $750,000 annually. Whales are found along the coast in large numbers, and their product, together with that of seals, amounted in 1890 to the sum of

$2,490,373. There are many reptiles, but only one poisonous serpent, the rattlesnake.

Much of the land in the southern and southeastern part of the state is arid from lack of water, and for some years much attention has been given to irrigation. In 1894 the acreage under irrigation exceeded 5,500,000 acres, of which some 3,800,000 acres was under cultivation. (See IRRIGATION, in these Supplements.)

The school system of the state is admirably modeled and well conducted, being under the direct control of a state board of education, consisting of five members, with the governor as *ex officio* president of the board. The average annual attendance of children at the state schools is about 240,000. There are about 3,000 school districts, 60 high schools, 1,900 grammar schools, 2,800 primary schools, 3,250 public school buildings and about 6,000 teachers. The annual expenditures for school purposes are about $5,000,000. The principal insti-



STATE CAPITOL, SACRAMENTO.

tutions for superior instruction are the University of California and the Leland Stanford Junior University. (See CALIFORNIA, UNIVERSITY OF; and also LELAND STANFORD JUNIOR UNIVERSITY, in these Supplements.) There are 13 other colleges, 4 theological schools, 1 of law and 3 of medicine, in addition to many seminaries of high grade, as well as many commercial and business colleges. There are normal schools located at Chico, Los Angeles and San José, the three having a total attendance of about 2,000 students, and receiving state aid to the amount of about $100,000 annually. The San Francisco Academy of Sciences is an institution of high rank. The textbooks used in the state schools are printed under the supervision of the state board of education and furnished to pupils at actual cost.

The state library at Sacramento contains about 95,000 volumes, and is liberally sustained by legislative appropriation. In 1880 an act was passed providing for the establishment of free public libraries and the maintenance of the same, with reading-rooms attached. Under this law about 30 of these institutions have been organized and are actively operated, with over 300,000 volumes on their shelves. In addition are many other libraries free to the public, supported by societies or subscription.

In 1894 California had 35 national banks and 175 state banks, with a combined capital exceeding $53,000,000. There were also 60 savings banks, and these, together with the state and national institutions, held individual deposits in excess of $190,000,000.

The number of miles of railroad in operation in California exceeds 4,500.

According to the census of 1890, there were 11 religious denominations represented in the state, with 1,542 organizations, having 1,493 churches and halls, a membership of 255,869, and the value of the church property given as $10,656,376.

The charitable and educational institutions include the California state institution for the deaf and dumb and the blind, located at Berkeley, about four miles north of the city of Oakland. Some 250 afflicted persons are inmates, and the cost to the state is about $60,000 annually. The Industrial Home of Mechanical Trades for Adult Blind at Oakland has about 100 inmates, the current expenses of operating the home being about $20,000 annually. The California Home for Feeble-Minded Children, located at Glen Ellen, has about 300 inmates, requiring nearly $50,000 annually for their maintenance. The state provides five asylums for the care of her insane. They are located, respectively, at Napa, Stockton, Agnews, Mendocino and San Bernardino. These institutions are admirably conducted, and so liberal is the manner in which the unfortunate insane are cared for that California ranks second among the states in the comparative cost of maintaining asylums. At Yountville is located a veterans' home, where over 400 ex-sailors and soldiers are cared for, and the institution ranks first among the similar institutions of the kind in the United States in point of economical management, and fourth in point of benefits conferred.

California stands second in rank in the comparative cost of prisons. The largest of these correctional institutions is the state prison located at San Quentin, about 10 miles north of San Francisco, on the waters of the bay. About 1,200 prisoners are here confined, and about 700 are kept at Folsom, a town about 20 miles northeast of Sacramento, on the American River. About half a mile from the village of Ione, in Amador County, is the Preston School of Industry. It is not conducted on the plan of a penal institution, but rather, as its name indicates, as an industrial school, designed to be a place of reformation for boys whose habits of life and environment are leading them toward a criminal career. There is also a Reform School for Juvenile Offenders located at Whittier, some 15 miles southeast of Los Angeles, which has on an average 250 boys and 50 girls, all of whom are taught some useful trade or occupation to fit them for contact with the world.

California has a national guard, with an average strength of 5,000 officers and men. The annual appropriation for the maintenance of the guard is near $100,000, and from the general government sums ranging from $10,000 to $20,000 have been annually received, mostly in the way of arms and accoutrements. The state stands fourth in the comparative cost of the maintenance of its militia force.

In 1890 the sum expended for the support of the state and local governments reached $24,000,000,

giving the state the rank of sixth in this connection. Within the past few years this has been much decreased, retrenchment and economy prevailing with the officials having the power to regulate expenditures.

The assessed value of all kinds of property for the year 1894 was $1,216,700,283, constituting about 4 per cent of the entire property of the United States. This valuation gives a *per capita* ownership of $2,097, the largest of any of the states. The total state debt amounts to $2,282,500.

The state is divided into 57 counties, in 56 of which newspapers are published. There are 647 newspapers published, of which 102 are daily, 458 weekly, and the remainder ranging from four times a week to monthly.

The principal cities and towns of California are as follows, the populations given being according to the census of 1890: San Francisco, 298,997; Los Angeles, 50,395; Oakland, 48,682; Sacramento, 26,386; San José, 18.060; San Diego, 16,159; Stockton, 14,424; Alameda, 11,165; Fresno, 10,818; Vallejo, 6,343; Santa Barbara, 5,864.

The population of California has increased rapidly since 1850, the date of the admission of the state to the Union. It was then 92,597. In 1860 it had increased to 379,994. The increase during the next ten years was not so great, the census of 1870 giving the population as 560,247. In 1880 the number had increased to 864,694, and in 1890 to 1,208,130. Of this latter number 1,111,558 were white; 71,681 were Chinese; 12,355 were Indians; 11,437 were colored, and 1,069 were Japanese. The census of 1890 disclosed the fact that California had about two per cent of the entire population of the United States, thus ranking twenty-second. The total vote cast for governor in 1894 was 284,548, indicating an increase in the population since the taking of the decennial census of about the required number of inhabitants to bring the whole number of people up to the estimate, which was 1,250,000.

The following is a list of the governors of the state since California was admitted to the Union:

1849, Peter H. Burnett; 1851, John McDougal; 1852, John Bigler; 1856, J. Neely Johnson; 1858, John B. Weller; 1860, Milton S. Latham; 1860, John G. Downey; 1862, Leland Stanford; 1863, Frederick F. Low; 1867, Henry H. Haight; 1871, Newton Booth; 1875, Romualdo Pacheco; 1875, William Irwin; 1880, George C. Perkins; 1883, George Stoneman; 1887, Washington Bartlett; 1887, R. W. Waterman; 1891, H. H. Markham; 1895, James H. Budd; 1899, H. T. Gage.

See California, Vol. IV, pp. 694 et seq.

CALIFORNIA, University of, at Berkeley, California; established in 1868 by act of the legislature; founded in reality 13 years previous as the College of California, which first organized classes in 1860. The Agricultural College is a part of the University. The University is supported by legislative appropriation in the form of an annual state tax. The Agricultural College receives aid from the United States government. Within the last few years large private benefactions have been received. Martin Kellogg is its president. There were, in 1895, 235 in the faculty, with 2,000 students. It has a library of 65,000 volumes. Since its foundation it has graduated 2,431.

CALIPPIC PERIOD. See Calendar, Vol. IV, p. 668.

CALISTHENICS is the Greek name for exercises promoting gracefulness and strength, and comprises the more gentle forms of gymnastics, especially for girls. It now constitutes an important part of the physical training of girls at American colleges. A notable system of physical culture has been inaugurated at Wellesley College, near Boston, Massachusetts. In that institution a fine gymnasium, elaborately equipped, was erected in the fall of 1891, and three hours per week of attendance, under competent instructors, were required of every member of the freshman class. The results, which have been watched with much interest, have proved very satisfactory, not only in the development of physique and a marked improvement in the carriage and vigor of the girl students, but in their increased capacity for mental application, and similar departments have been organized in all of the larger educational institutions of the United States. See Gymnastics, Vol. XI, p. 348.

CALISTOGA, a town of Napa County, central eastern California, situated near the petrified forest, about 65 miles N. of San Francisco, on the Southern Pacific railroad, 3 miles from the base of Mt. St. Helena. It is noted for its mineral springs, and is a popular summer resort. Wine-making and mining are its principal industries.

CALIVER, a matchlock or firearm about midway in size and character between an arquebus and a musket, used in the sixteenth century. It was small enough to be fired without a rest or support.

CALIXTINES, the more moderate sections of the Hussites in Bohemia. See Hussites, Vol. XII, p. 407.

CALLA, an aquatic or marsh-loving genus of *Araceæ*, of a single species, *Calla palustris*, the water arum. It has white spathes, cordate heart-shaped leaves, flowers crowded up to the extremity of the spadix, and red berries. It is widely distributed through the cold marshes of Europe and North America, and acquires some economic importance in Lapland and parts of Russia, from the fact that its root-stock, when deprived of its acrid properties by cooking, is a source of starchy matter, used in bread-making. The well-known and beautiful *Richardia*, the calla of house-cultivation, is an allied genus. See Horticulture, Vol. XII, p. 264.

CALLANDER, a village in Perthshire, central Scotland, on the left bank of the Teith, 16 miles N.W. of Stirling. It lies in a beautiful and romantic situation, surrounded by the lofty mountains and Highland lakes of the Trossachs (q.v., in these Supplements), and is a famous resort for tourists. Population, 1,538.

CALLENDER, John, historian; born in Boston, Massachusetts, in 1706; died in Newport, Rhode Island, Jan. 26, 1748. He came of a distinguished Puritan family, two members of which have been ministers. He graduated at Harvard, and became pastor successively of a Baptist church in Boston; in

Swansea, Massachusetts; and in Newport, Rhode Island. At the latter place he was a member of a society called "Company of the Redwood Library." He delivered an address in 1738 entitled *An Historical Discourse on the Civil and Religious Affairs of the Colony of Rhode Island and Providence Plantations, From the First Settlement to the End of the First Century.* This was, for one hundred years, the sole history of Rhode Island. He published a series of papers relative to the history of the Baptists in America.

CALLERNISH, a district on the west coast of the island of Lewis, of the Hebrides group, 16 miles from Stornoway, remarkable for its prehistoric stone circles, of which there are four, at no great distance apart. Similar circles are found at Stonehenge, England, described under RUDE STONE MONUMENTS, Vol. XXI, p. 51; see also ARCHITECTURE, Vol. II, p. 383; LEWIS AND HARRIS, Vol. XIV, p. 492.

CALLICHTHYS, a genus of fishes found in South America. They are characterized by two rows of bony plates on either side, which extend the entire length of the body. See SILURIDÆ, Vol. XXII, p. 69.

CALLIGONUM, a genus of plants of the family *Polygonaceæ*, having a quadrangular fruit winged at the angles. The best-known species is a succulent shrub found on the sandy steppes near the Caspian Sea, where its acid shoots and fruit often serve to allay thirst. The roots afford a nutritious gum.

CALLIGRAPHY. See PALÆOGRAPHY, Vol. XVIII, pp. 143 et seq.

CALLINGER OR KALINJAR, one of the hill forts of Bundelcund, India, district of Banda, 112 miles N.W. of Allahabad; elevated 1,200 feet above the adjacent plain. From its position and size it must at one time have been a place of great strength. At the base of the rock stands a town of the same name, which, though much decayed, still bears testimony of its ancient grandeur. See BANDA, Vol. III, p. 309.

CALLITRIS, a genus of the *Coniferæ*. See MOROCCO, Vol. XVI, p. 833; also SANDARACH, Vol. XXI, p. 256.

CALLUS, a botanical term with the following applications: 1. A parenchyma tissue which covers wounds preceding the formation of cork. From these callus-cells adventitious roots and buds may arise. The term is applied in horticulture to the cap formed over the end of a cutting. 2. A peculiar substance which covers both surfaces and lines the pits of the "sieve-plates" (q.v.), and in some cases periodically closes the pits in autumn. 3. Very loosely applied to any hard excrescence upon a plant.

CALMS OR CALM LATITUDES, those parts of the ocean near the equator which are subject to total absence of wind for long periods at a time. See METEOROLOGY, Vol. XVI, pp. 143, 144.

CALONNE, ALPHONSE BERNARD DE, VISCOUNT, French writer; born at Béthune, May 17, 1818; engaged in political writing and art criticisms. His politics caused him trouble with the government, and on account of his severe criticisms he was compelled to fight several duels. Since 1870 he has written the reviews and art criticisms for *Le Soleil*. Among his writings are *Bérangère*, a novel; *La Politique de la France dans les Affaires d'Allemagne et d'Italie;* and *Les Ophidiennes.*

CALOPHYLLUM, a genus of trees of the family *Guttiferæ*, natives of warm climates. Some of the species yield valuable timber and also supply valuable resins, while the seeds of other varieties produce a fixed oil used in lamps and for other purposes. *C. inophyllum* of the East Indies is one of the most valuable as well as one of the most beautiful timber trees of its region, its bark also yielding the gum resin known as "East Indian tacamahac."

CALORIMETER. Among recent forms of calorimeter the Junker gas-calorimeter, designed for laboratory work, testing gas-engines, etc., is worthy of mention. Much error has resulted from judging of gas by its candle-power, which may vary materially from its heat-giving qualities. In this instrument the heat generated by a flame is transferred to a current of water flowing at a constant rate, and measurements are taken of the quantity of gas burned, of the quantity of water passed through, and of the increase of temperature of the outgoing water over the incoming water. It is made like an upright boiler, with copper tubes, through which the heated gases rise, while the water runs downward outside the tubes. The spent gases are allowed to escape from a throttle, at atmospheric pressure.

M. Mahler's calorimeter consists of a graduated vessel for holding a specific quantity of water, and of an inverted glass bell, from which the gaseous products of combustion are compelled to flow and pass through the water. There is also a platinum crucible forming the combustion chamber for the fuel to be tested, and a steel bottle of compressed oxygen connected by tubes with the crucible.

The calorimeter of MM. Le Chatelier and Cornu is of the optical pyrometer type, being designed for use in tempering and similar operations. It consists of a telescope to shut off outside light, and an oil-lamp as a standard of comparison, and renders visual test of heat by the color of the flame much more accurate than where ordinary means of observation are used. See HEAT, Vol. XI, pp. 556, 567.

C. H. COCHRANE.

CALORIMOTOR, an electrical apparatus so named on account of its heat-producing powers. It consists of a voltaic battery in which the zinc-copper plates are so large as to cause a very slight internal resistance, permitting a large quantity of electrical energy to be produced, and, when short wires are used, a considerable amount of heat. The deflagrator of Hare was the first form.

CALOTTISTS (*Le Régiment de la Calotte*), a society of witty and satirical men, in the times of Louis XIV, who were headed by two officers in the king's bodyguard, named Torsac and Aimon. Their name was taken from the cap which formed the symbol of the society. Their amusement consisted in sending to any public character who had made himself ridiculous a "patent" authorizing him to wear the *calotte* as a covering for the weak part of his head. As the society became audacious, and did not spare even royalty itself, it was suppressed during Fleury's administration.

CALOVIUS OR KALAU, ABRAHAM, the chief representative of controversial Lutheran orthodoxy in the seventeenth century; born at Mohrungen, in East Prussia, April 16, 1612; died at Wittenberg, Feb 25, 1686. He was successively professor at Königsberg, preacher at Danzig, and professor at Wittenberg. He waged war incessantly on Arminian, Socinian, Reformed and Catholic doctrines, and was very bitter agaiust Calixtus. He was six times married, the last time, in his seventy-second year, to a young daughter of his colleague, Quenstedt. Calovius's chief writings are his *Systema Locorum Theologicorum* (12 vols., 1655–77) and *Historia Syncretistica.* (1682).

CALOYERS ("good old men"), a general name for the monks of the Greek Church. The caloyers follow the rule of St. Basil, and devote much time to devotional exercises. They are of three ranks, *Archari* or novices, *Microchemi* or professed, and *Megalochemi* or perfect. From among the last the bishops and patriarchs are chosen. The caloyers furnish practically the only learned theologians in Greece at the present time. They occupy numerous monasteries, the most noted of which are the ancient monastery of Mount Sinai, and the cluster of monasteries at Mount Athos, Greece.

CALPE, one of the pillars of Hercules, identified with Gibraltar. See GIBRALTAR, Vol. X, p. 585.

CALPENTYN, a long and narrow peninsula on the west side of Ceylon, in lat. 8° 14′ N., long. 79° 53′ E. The neck is so low as to be overflowed during the northeast monsoon, so that it is transformed into an island.

CALTABELOTTA OR CALATA BELLOTA, a town of west Sicily, 10 miles N.E. of Sciacca, most picturesquely situated around an ancient castle which crowns a steep rock overhanging a stream. There is a beautiful church, the Chiesa Matrice, here. Caltabelotta was long a Saracen town, and its name is said to be derived from Kalaat-el-Ballut ("the castle of the cork trees"). Population, 6,178.

CALTANISETTA, province and city of central Sicily; the province lies west of Girgenti and south of Palermo. Its southern side is washed by the Mediterranean. There are manufactures of chemicals and iron, marble-quarries, and olive and grape yards. Area, 1,455 square miles. Population in 1891, 266,379. The city, capital of the province, is fortified, and is situated 28 miles N.E. of Girgenti. Sulphur springs and works are here. Population in 1893, 36,500.

CALTHA, a genus of plants belonging to the family *Ranunculaceæ*, found in marshy places in the cold and temperate regions of both hemispheres. *C. palustris* is the common "marsh-marigold," or "cowslips," of the United States. It bears somewhat kidney-shaped leaves and showy yellow flowers in early spring. The young plants are boiled for "greens."

CALTHROP OR CALTHORP, in military warfare, a piece of iron with four prongs, each prong about four inches in length, used to check the approach of the enemy's cavalry. See HERALDRY, Vol. XI, p. 703.

CALTROP, a name applied in botany to certain plants with spiny heads or fruits, such as the common caltrop, *Centaurea Calcitrapa* (a thistle, with spiny heads); species of *Tribulus*, with spiny fruit; *Trapa natans*, with spiny fruit; *Cenchrus tribuloides*, whose spiny spike is usually called a "sand-bur"; etc.

CALUMBA OR COLUMBO, used in medicine, is the root of *Jateorhiza Calumba* (*J. palmata*), a menispermaceous climber of eastern Africa. Its bitterness and other properties are ascribed to the presence of columbin, berberin and columbic acid. It is a useful, mild tonic and stomachic. American calumba root, or columbo, is obtained from *Frasera Walteri*, a gentianaceous biennial, and has properties like those of gentian.

CALUMET, a village of Houghton County, Michigan, situated in the copper region, near the northernmost point of the upper peninsula, on the Hecla and Torch Lake railroad, 15 miles from Houghton. It contains a celebrated copper-mine, often spoken of as the richest in the world. See MICHIGAN, Vol. XVI, p. 239. Population 1894, 2,192.

CALUMET OR PEACE-PIPE. See PIPE, Vol. XIX, p. 111.

CALVARY, MOUNT. See MORIAH, Vol. XVI, p. 824.

CALVÉ, EMMA, operatic vocalist, was born in France about 1866. Her father was a civil engineer and died during her girlhood. She received lessons from Signora Marchesi. Her *début* was in Gounod's *Faust*, at the Théatre de la Monnaie, Brussels, in 1882. In Paris, in 1884, she played various parts, and afterward made a tour of Italy. She was very successful at Covent Garden, in 1892, in *Cavalleria Rusticana* and *L'Amico Fritz*, and appeared in both, by command, before the Queen, in July, 1893. She made an American tour in 1894 and another in 1896, both highly successful.

EMMA CALVÉ.

CALVERLEY, CHARLES STUART, English parodist; born Dec. 22, 1831; died at Folkestone, Feb. 17, 1884. He was educated at Harrow, Oxford and Cambridge, and in 1865 was called to the bar, and settled in London, but a fall on the ice in the winter of 1866–67 put an end to what promised to be an exceptionally brilliant career. One of the most gifted and scholarly men of his time, and unrivaled as a humorist, Calverley will be remembered by his two little volumes, *Verses and Translations* (1862) and *Fly-Leaves* (1872).

CALVERT. For an account of GEORGE CALVERT, first Lord Baltimore, see CALVERT, Vol. IV, p. 713.—CECIL CALVERT, second Lord Baltimore, was born about 1603, and succeeded to his father's title in 1632. In 1634 he sent an expedition to his American territory, under the charge of his brother, Leonard, and thus became the real founder of the colony of Maryland. (See MARYLAND, Vol. XV, p. 605.)—LEONARD CALVERT, the first governor of the colony,

was born about 1606, and died in 1647. The title became extinct upon the death of FREDERICK CALVERT, the seventh Lord Baltimore, in 1771.

CALVERT, GEORGE HENRY, author; born in Prince George County, Maryland, Jan. 2, 1803; died in Newport, Rhode Island, May 24, 1889. He was a great-grandson of the first Lord Baltimore. Having graduated at Harvard, he studied at Göttingen, Germany, and on his return resided in the neighborhood of Baltimore, edited the Baltimore *American*, and then removed to Newport, Rhode Island, and in 1853 became mayor of that city. He wrote for periodicals and published numerous dramas, pamphlets and books, among which are *Scenes and Thoughts in Europe; Life of Rubens; Introduction to Social Science;* and *Biographic Æsthetic Studies.*

CALVERT, a city, the old capital of Robertson County, central Texas, about 85 miles N.E. of Austin, on the Houston and Texas Central railroad. It contains manufactories of cottonseed-oil, and is the business center of a fertile agricultural district. Population 1890, 2,632.

CALVI, FELIX, COUNT, Italian historian; born in Milan, Dec. 16, 1822. His first work was a novel, *Un Château dans la Campagne Romaine.* In a short time he abandoned novel-writing and devoted himself to the study of history. In 1871 he founded the Historical Society of Lombardy, of which he has since been president. Among his many writings the more important are *Di Ansonio Franchi e della Filosofa Contemporanea; Curiosità Storiche e Diplomatiche del Secolo XVII;* and *Bianca Maria Sforza Visconti Regina dei Romani.*

CALVO, CARLOS, an Argentine lawyer, diplomat and author; born in Buenos Ayres, Feb. 26, 1824; in 1860 minister to Paris and special representative to London; in 1885 minister to Berlin; an officer of the Legion of Honor, and correspondent of the Historical Institute of Paris and of the Academy of Sciences. He has published *An Account of the Treaties, Conventions and Other Diplomatic Acts of the Latin-American States; Theory and Practice of International Law;* and *Dictionary of Diplomacy and Private and Public International Law.*

CALX, a Latin term for quicklime. As quicklime is produced by burning limestone, the alchemists applied the term *calx* to the substance of a metal or mineral that remains after being subjected to extreme heat and calcination.

CALYCANTHUS, a genus of *Calycanthaceæ;* a small order, of which only a few species are known, natives of North America and Japan. They are square-stemmed, aromatic shrubs, with purple flowers which have the odor of strawberries. The most common species in the United States is *Calycanthus floridus,* called "Carolina allspice," or "sweet-scented shrub."

CALYCIFLORÆ, a term introduced by De Candolle to include those natural orders of dicotyledons in which the sepals and petals are separate, as in *Thalamifloræ,* but in which the stamens, instead of being hypogynous are perigynous or epigynous. It includes the *Leguminosæ, Rosaceæ, Saxifragaceæ* and other related orders.

CALYDONIAN BOAR, in Grecian mythology a frightful animal sent by the goddess Artemis to lay waste the fields of Œneus, king of Calydon, because he had omitted a sacrifice to her. The king being absent on the Argonautic expedition, no one dared to face the monster, until Meleager, the son of Œneus, with a band of heroes, pursued and slew him.

CALYMENE, a genus of the fossil order *Trilobites,* found in the Silurian rocks. *Calymene Blumenbachii,* known as the "Dudley locust," is very abundant in the Wenlock limestone. See GEOLOGY, Vol. X, p. 335.

CALYPSO BOREALIS, a beautiful orchid of the northern hemisphere, extending in the United States from the north Atlantic states to Colorado and Oregon, and throughout British America. It is a low, bog herb, with a single thin ovate or cordate radical leaf, a scaly stem, and a solitary drooping rose-colored flower mottled with purple, appearing in early spring.

CALYPTRÆA, a genus of mollusks, sometimes popularly known as chambered cup-and-saucer, bonnet or slipper limpets. It is the typical genus of the family *Capulidæ.* The shapes vary considerably. Some ten living species are known, mostly from warmer waters. See MOLLUSCA, Vol. XVI, pp. 649, 650.

CALYX, in botany the external envelope of the flower. See BOTANY, Vol. IV, p. 131.

CAM OR GRANTA, a river of England, which rises near Henham in Essex and flows northeast through Cambridge and there joins the Ouse. In its course it passes through the handsome park of the Nevilles, Barons Braybrooke, at Audley End, and completes the picturesque scenery of the "backs" of the colleges of Cambridge University. See CAMBRIDGE, Vol. IV, pp. 728, 729.

CAMARGUE, a district at the mouth of the Rhone, France. See BOUCHES-DU-RHONE, Vol. IV, p. 169.

CAMARILLA, a Spanish word, literally, "a little chamber," signifies, throughout Europe, the influence exercised on the state by the favorites of a monarch, in opposition to the advice of his legitimate ministers. It first obtained this meaning in the time of Ferdinand VII of Spain. It is sometimes applied to the audience-room of the king.

CAMASSIA, a bulbous genus of the family *Liliaceæ.* The white or blue flowers are in racemes on a naked scape rising from a cluster of linear flat leaves. *L. esculenta* of the mountains of the northwestern United States is the "camass," or "quamash," of the Indians, the bulb being largely collected by them for food. *C. Fraseri* (*Scilla Fraseri*) is a species of the Atlantic states, often called "wild hyacinth." The genus is closely related to *Scilla,* or "squills," of Europe.

CAMAYEU AND MONOCHROME, terms by which painting in one color is designated. The ancients made them both in gray and in red. Pictures of several tints, but where the natural colors of the object are not copied, are also said to be *en camayeu.* As one color generally prevails, we speak of blue, red, yellow, green camayeu. The word is sometimes used for cameo.

CAMBERWELL BEAUTY (*Vanessa Antiopa*), a

butterfly almost world-wide in range. In America it ranges from Alaska to Brazil, and in the Old World from Lapland to Africa. The wings are purplish brown above, with yellow border marked with blue spots, and black beneath, with scattered yellow scales. The caterpillar, black, with red and white spots on the back, lives on the foliage of the willow and poplar.

CAMBIST, an Italian word for money-changer, or one who is versed in the operation of exchange; also used figuratively as the title of a book in which moneys, weights, measures, etc., of various nations are given in the equivalents of some particular one.

CAMBIUM, an embryonic meristem tissue, composed of thin-walled cells rich in protoplasm, and lying between the wood and bast. By its activity new wood and bast are formed, increasing the member in diameter. It is characteristic of the stems of dicotyledons and gymnosperms, resulting in the production of the growth-rings (annual rings). When bark is peeled off, the line of easy separation is furnished by the cambium.

CAMBON, Jules-Martin, French lawyer, administrator, and diplomatist; was born in Paris, April 5, 1845. He studied law, and in 1866 became an advocate. During the Franco-Prussian war of 1870, he served with distinction as captain of the mobiles of Seine-et-Marne. After the war he was made auditor to the provisional commission which took the place of the former council of state. From 1873 to 1878 he held office under and was confidential adviser to General Chanzy, governor-general of Algeria; and on June 13, 1878, he was made prefect of the department of Constantine, in that colony. He was recalled to France, and on Feb. 19, 1879, was made secretary-general of the prefecture of police of the department of Seine. In 1882 he was made prefect of the department of Nord, and in 1889 prefect of the department of Rhône. In April, 1891, he was appointed governor-general of Algeria, holding that office till 1897. In 1898 he was appointed French ambassador extraordinary and plenipotentiary to Washington; and it was through him that Spain, on July 26, 1898, made overtures for peace to the government of the United States, and by him that the peace protocol of August 12 was signed on behalf of Spain. On Feb. 6, 1879, he was made a member; on July 9, 1883, an officer; and on Oct. 31, 1889, a commander, of the Legion of Honor. He is a younger brother of M. Pierre-Paul Cambon (born Jan. 20, 1843), who was from 1890 to 1898 French ambassador at Constantinople, and who is now (1899) French ambassador to Britain.

CAMBRIA, the ancient name of Wales, the Britannia Secunda of the Romans. The name is derived from that of Cimbri or Cymri, by which the Welsh have always called themselves.

CAMBRIAN PERIOD, in geology a period not clearly defined, but lying between the Archæan and the Lower Silurian. See Geology, Vol. X, pp. 329–31.

CAMBRIC, a general term applied to the finest and thinnest of linen fabrics. It is said to be derived from Cambray (q. v. Vol. IV), a city of France, formerly of Flanders, where the goods were first manufactured. Scotch cambric is really a muslin, being made of cotton with the fiber twisted very hard, to imitate real or linen cambric.

CAMBRIDGE, a village, capital of Henry County, northwest Illinois, 30 miles E. of Rock Island, on the Rock Island and Peoria railroad. Pop. 1890, 940.

CAMBRIDGE, a town, capital of Dorchester Co., Md., on the Choptank river, about 50 miles S. E. of Annapolis; is an important shipping-point for oysters, herring, and shad; contains several canning factories and tobacco, flour, and stave factories, and two excellent academies. Pop. 1890, 4,192.

CAMBRIDGE, a city of Middlesex County, east Massachusetts, the seat of Harvard College. For history and location, see Cambridge, Vol. IV, p. 732. The city includes Old Cambridge, North Cambridge, Cambridgeport, and East Cambridge. Harvard College is in the center of Old Cambridge. At the east end of Harvard Square still stands the famous Wadsworth House, built in 1726, in which the successive presidents of Harvard College lived for 125 years. At the western end still stands a venerable elm, surrounded by an iron fence, marked with a granite slab, which records that "Under this tree Washington first took command of the American army, July 3, 1775." North Cambridge is a district of much commercial importance. Cambridgeport, lying between Old Cambridge and the West Boston Bridge, contains many large manufactories. East Cambridge, the most recently settled portion of the city, contains the public buildings. Population 1890, 70,028; 1895, 81,643.

CAMBRIDGE, a village, capital of Isanti County, central eastern Minnesota, 44 miles N. E. of Minneapolis. Population 1890, 391.

CAMBRIDGE, a village of Washington County, central eastern New York, about 35 miles N. E. of Albany, on the Delaware and Hudson railroad. It contains manufactories of machinery, flour, leather, and lumber, and is the seat of Cambridge Washington Academy. The Cambridge valley agricultural fair, annually held here, is one of the most complete agricultural exhibits in the state. Pop. 1890, 1,598.

CAMBRIDGE, a city, capital of Guernsey Co., Ohio, in an agricultural and mining region, about 60 miles N. of Marietta, on the Baltimore and Ohio and the Cleveland and Marietta railroads. Coal and natural gas are found in the vicinity, and the town contains important manufactories of flour, iron, pottery, and roofing. The general offices and shops of the Cleveland and Marietta railroad are located here. Population 1890, 4,361; 1897, about 6,000.

CAMBRIDGE, George William, Duke of, born in Hanover, March 26, 1819. He is the son of Adolphus Frederick, first Duke of Cambridge; also grandson of George III and first cousin of Queen Victoria. In 1856 he was made commander-in-chief of the British forces, and in 1862 was made a field-marshal.

CAMBRIDGE CITY, a village of Wayne County, east-central Indiana, on the Whitewater river, 15 miles W. of Richmond, on the Cleveland, Cincinnati, Chicago and St. Louis, the Lake Erie and Western, and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. It contains extensive factories of railroad cars, machinery, furniture, sashes and

blinds, flour and lumber. It is the northern terminus of the Whitewater Canal. Population 1890, 1,782.

CAMBRIDGE GREENSAND, a name given to certain "coprolite beds" met with in Cambridgeshire, which were at one time supposed to represent the upper greensand. The beds in question are now ascertained to occur on the horizon of the base of the chalk marl. See COPROLITES, Vol. VI, p. 353.

CAMBRIDGE PLATFORM, a statement of a system of government for the Congregational Church, drawn up at Cambridge, Massachusetts, in 1648. The system was to be a means of bringing uniformity into the Church government. A wide difference existed among the New England Congregationalists. This system, in general, is the same as now in use by the Church.

CAMBUSLANG, a large mining village of Lanarkshire, Scotland, 4 miles S.E. of Glasgow. Here a revival, known as the "Camb'slang Wark," was held under Whitefield in 1741. Population, 5,538.

CAMDEN, a town, capital of Wilcox County, southwest Alabama, 4 miles S. of the Alabama River, 36 miles S.W. from Selma. An academy and seminary are located here. Population 1890, 545.

CAMDEN, a city, capital of Ouachita County, central southern Arkansas, situated at the head of low-water navigation on the Ouachita River, 100 miles S.W. of Little Rock, on the St. Louis, Iron Mountain and Southern and the St. Louis Southwestern railroads. It is a shipping-point for cotton and an important center of trade. Steamboats ply between here and New Orleans. It contains several establishments for the manufacture of flour. Population 1890, 2,571.

CAMDEN, a town of Kent County, central Delaware, three miles S. of Dover. It is the seat of an academy. The chief industry is the canning of fruits. Population 553, in 1890.

CAMDEN, a village of Knox County, southern Maine, on the west shore of Penobscot Bay, about nine miles N. of Rockland. It contains manufactories of railroad cars, car-wheels, pumps, spikes, anchors and woolen goods, and is engaged in commerce, ship-building, and the exportation of lime.

CAMDEN, a city of Camden County, central western New Jersey, on the Delaware River, opposite Philadelphia, with which it is connected by several lines of ferries. It is an important railway city, seven railroads having their termini here; namely, Camden and Amboy, Camden and Burlington County, Camden and Atlantic, Philadelphia and Atlantic City, West Jersey and Camden, Gloucester and Mount Ephraim. The city has increased rapidly during the last 20 years, both in population and business; in part, however, by annexation of a portion of Newton. There are located here eight shipyards, with dry-docks, marine railways, etc., iron foundries, boot and shoe factories, and manufactures of paints, oils, etc. The water-works which supply the city with water from the Delaware River are at Pavonia, about one mile north of Camden. Population, 63,467, in 1895.

CAMDEN, a village of Oneida County, central New York; about 18 miles N.W. of Rome, on the Rome, Watertown and Ogdensburg, and Elmira, Cortland and Northern railroads. It contains important manufactories of leather, furniture, woolen goods, rakes and iron, and has several vegetable and fruit canning factories. Population 1890, 1,902.

CAMDEN, a town, capital of Camden County, northeast North Carolina, on the Pasquotauk River, 42 miles S. of Norfolk, on the Norfolk and Southern railroad. Population 268, in 1890.

CAMDEN, a town, capital of Kershaw County, central northern South Carolina, 1 mile E. of the Wateree River and 32 miles N.E. of Columbia, on the Ohio River, and Chattanooga and the South Carolina and Georgia railroads. Ancient Indian mounds are found in the vicinity. It is an important educational and trade center. During the Civil War it was captured by General Sherman, and large stores of cotton and tobacco and most of the business houses were burned. Population 1890, 3,533. See CAMDEN, Vol. IV, p. 734.

CAMDEN, a town, capital of Benton County, west Tennessee, 87 miles W. of Nashville, on the Nashville, Chattanooga and St. Louis railroad. Population 330, in 1890.

CAMDEN SOCIETY, an association formed in London, in 1838, for the purpose of publishing historical and other manuscripts of antiquarian or literary interest. The name was taken in honor of William Camden, the historian. The publications of this society are highly valued. Over 165 volumes have been issued.

CAMEL, a caisson-like apparatus for floating a vessel through shoal-water or over sand-bars. It was invented by Bekker of Amsterdam, Holland, about 1690. It is often used between Kronstadt and St. Petersburg. The principle on which it operates is very simple. A large, light caisson, or "camel," nearly filled with water is attached to each end of the vessel to be raised. The water is then pumped out, and the buoyancy of the exhausted "camels" floats the vessel over the obstruction. Machines made on the same principle are used in dry-docks.

CAMELFORD, a village in the northwest of Cornwall, England, 11 miles N.E. of Bodmin, near the source of the Camel, 14 miles from Launceston. It lies in a high and hilly tract, and is said to have been the scene of a battle between King Arthur and his nephew, Mordred, A.D. 542, in which both were slain. Population, 800.

CAMELOPARDALIDÆ. See GIRAFFE, Vol. X, pp. 618–620.

CAMELOT, a steep hill of Somersetshire, England, near Ilchester, in the parish of Queen's Camel, identified by tradition with one of the capitals of the legendary King Arthur. There are some remains of remote antiquity in the vicinity.

CAMEL'S HAIR, an article of commerce in the east of Europe, Arabia and Persia, the camelinum of the middle ages. It is used by the Arabs in making carpets, tents and wearing-apparel. In France, the imported hair is used in the manufacture of hats. The fine hair from which artists' pencils are made is imported from Smyrna and Constantinople, but originally was obtained in Persia. There are three qualities—red, black and gray. Of these the black is considered the best. The "camel's hair"

cloth sold in some places is in reality woolen. For imitation Camel's Hair, see ABATTOIRS in these Supplements.

CAMEL'S THORN, a name primarily applied to species of *Alhagi*, a genus of plants of the family *Leguminosæ*, containing a number of herbaceous or half-shrubby species. These plants are of great importance on account of the food which they afford for camels, as they are natives chiefly of the deserts of the East. (See MANNA, Vol. XV, p. 493.) *A. Maurorum* exudes a sweetish substance, which is one of the numerous "mannas" of the Oriental deserts. The name is also said to be applied in Persia and India to a species of *Zizyphus* used as fodder for sheep and goats, and in South Africa to various species of *Acacia* browsed upon by giraffes.

CAMENÆ, according to Italian ancient religion four prophetic nymphs, but identified with the Muses by later mythology. The most important of these ancient nymphs was Carmenta; her associates, Antevorta, Egeria and Postvorta.

CAMERAS. The changes which have been made in cameras consist principally in adjustments and attachments, and have had for their object the securing of compactness, portability, convenience and efficiency. The principle of the camera obscura remains unchanged.

The introduction of the "square" form of camera for outdoor work marks one of the chief advances. It was common to construct cameras so that the view presented upon the ground glass would be "horizontal." If a "vertical" view—say, of a tree or a tall building—was preferred, the camera had to be removed from the stand or tripod and readjusted. This required time; and while it was being done, the light upon the scene might change or the best chance pass entirely away.

The newly constructed square camera is provided with a reversible front (or back, according to style), which permits the quick reversal of the plate-holder from a "vertical" to a "horizontal" plane, and *vice versa*, as the circumstances require. To secure the advantages of such a contrivance, the bulk of the camera must be increased; but that is no great disadvantage. The "revolving-back" camera accomplishes similar advantages, but it is more expensive, and not so desirable practically.

Modifications have been made in the single and double swing attachments, which secure greater lightness and speedier action. The construction of the front board upon which the objective is fixed, so that it may be raised or lowered at will, has also been so altered as to provide greater facility and less cumbersomeness. By the use of the sliding front the operator regulates the height of the horizon in a landscape or the measure of foreground, and insures more artistic balance. The folding platform is sometimes supplemented by an added extension for use with objectives of very long focus.

The turn-table camera-base is an important improvement, having for its object the displacing of the loose tripod head. Using this invention, two metal flanges, one revolving inside the other (the inner flange being fitted with projecting pins which receive and hold the legs of the tripod) are inserted in the base-board of the camera. This arrangement secures portability, does away with the troublesome tripod screw, and enables the operator to instantly turn the camera toward any desirable point, where it may be held rigid by fastenings provided.

The introduction and evolution of the hand-camera presents one of the most interesting phases of photographic practice. "Its name is legion." It has contributed much, in careful hands, to photographic growth and improvement, yet it is responsible for much that degrades and disgusts the true photographer and his art. Only the most skilled can have good success with the "hand" or "snap-shot" camera, unless it be by accident, for it requires the best judgment as to light and composition.

Broadly speaking, hand-cameras may be divided into three classes: First, those constructed for glass plates, to be used in the common plate-holder or in magazine; second, those adapted for cut films also; and third, those fitted for a roll-holder, adapted for the use of bands of film sufficiently long for a number of exposures.

The modification of the camera and its parts for special uses in the various scientific and industrial applications of photography offers an interesting study. The panoramic camera, the photo-microscopic camera, the telescopic camera, the stereoscopic camera, the bicycle camera, the multiplying camera and the pinhole camera (used without a lens) are all ingenious in mechanism, and supply admirably the wants of the workmen for whom they have been designed. See PHOTOGRAPHY, Vol. XVIII, pp. 839, 840. EDW. L. WILSON.

CAMERON, a hamlet, capital of Cameron Parish, southwest Louisiana, on the east bank of Calcasieu River, 2 miles from the Gulf of Mexico and 90 miles N.E. of Galveston. Population 1890, 941.

CAMERON, a city of Clinton County, northwest Missouri, about 29 miles E. of St. Joseph, and 55 miles N.E. of Kansas City. It is an important railroad and trade center, on the Chicago, Rock Island and Pacific and the Hannibal and St. Joseph railroads. It is the seat of the Missouri Wesleyan College, Population 1890, 2,917.

CAMERON, a city, capital of Milam County, central Texas, 60 miles N.E. of Austin, on the Gulf, Colorado and Santa Fé and the San Antonio and Aransas Pass railroads. Has two colleges, one for men and the other for women. Pop. 1890, 1,608.

CAMERON, ANGUS, statesman; born in Caledonia, Livingston County, New York, July 14, 1826; removed to La Crosse, Wisconsin, in 1857; served several terms in both branches of the state legislature, and for nine years served as regent of the University of Wisconsin. From 1875 to 1885 he was U. S. Senator from Wisconsin. Died in Milwaukee, Wis., March 30, 1897.

CAMERON, CHARLES ALEXANDER, SIR, chemist; born in Dublin, Ireland, July 16, 1830; studied at Dublin and in Germany; public analyst to the city of Dublin in 1862; in 1867 professor of hygiene in the Royal College of Surgeons in Ireland; since 1876, professor of chemistry in that institution and in control of the department of health of Dublin.

He held important offices in British scientific associations. He was knighted in 1886. Besides numerous important papers on selenium compounds, he has published *History of the Royal College of Surgeons in Ireland; Manual of Hygiene and Compendium of the Sanitary Laws;* etc.

CAMERON, Henry Clay, clergyman and scholar; born in Shepherdstown, Virginia, Sept. 1, 1829; was graduated in 1847 at Princeton College, and at Princeton Theological Seminary in 1855; elected professor of Greek at Princeton in 1861; entered the ministry of the Presbyterian Church in 1859; became a member of the board of visitors of the West Point Military Academy in 1876. He has published a *History of the American Whig Society* and contributed largely to periodical literature.

CAMERON, James, soldier; born in Maytown, Lancaster County, Pennsylvania, March 1, 1801; killed at the battle of Bull Run, July 21, 1861. He entered his brother Simon's printing-office in Harrisburg in 1820; edited the Lancaster *Political Sentinel* in 1827; studied law; served as sutler in the Mexican War, and was colonel of the Seventy-ninth New York regiment at the outbreak of the Civil War.

CAMERON, James Donald, an American statesman; son of Simon Cameron; born in Middletown, Dauphin County, Pennsylvania, May 14, 1833. After graduating at Princeton he became successively clerk, cashier and president of the Middletown Bank. He was president of the Northern Central Railway Company of Pennsylvania from 1863 to 1874, when that road passed into the control and ownership of the Pennsylvania Railroad Company. Mr. Cameron is also interested in coal, iron and manufacturing industries. Under President Grant he held the portfolio of war in 1876; in 1877 he resigned to take his father's place in the United States Senate. He was re-elected Senator in 1879, 1885 and 1891.

JAMES DONALD CAMERON.

CAMERON, John Hillyard, Canadian statesman; born in Beaucaire, Languedoc, France, April 14, 1817; died in Toronto, Nov. 14, 1876. He was educated at Kilkenny College, Ireland, and in Toronto; entered the legal profession; was elected to the Canadian Parliament in 1846, and appointed Solicitor-General in the same year. He served for 16 years in the legislative body, and during that time was a prominent mover in a number of important bills, one of which secured better postal facilities between Canada, Great Britain and the United States. He was the author of several legal works, including *Rules of Court Relating to Pleading in the Court of Queen's Bench.* He was one of the commissioners appointed for the revision of the statutes of Upper Canada in 1840, and the consolidation of the statutes in 1856.

CAMERON, Malcolm, Canadian statesman; born at Three Rivers, Canada East, April 25, 1808; died in Ottawa, June 1, 1876. He was entirely self-educated and rose by his own efforts from the drudgery of stable-boy to positions of honor and profit under the Canadian government. He began his political career in 1836, as representative in the Upper Canada assembly, and was successively inspector of revenue, cabinet officer, president of the council, Commissioner of Public Works, Postmaster-General and member of the House of Commons from South Ontario.

CAMERON, Simon, an American statesman; born in Lancaster County, Pennsylvania, March 8, 1799; died there, June 26, 1889. He learned the printer's trade when only nine years of age, and in 1820 had risen to be editor of a newspaper in Doylestown, Pennsylvania. Two years later he edited another paper in Harrisburg. He held the office of adjutant-general for his state, and in 1845 was elected by the Democratic party as their representative in the United States Senate. In 1856, having become a member of the Republican party, he was sent to the United States Senate. When Abraham Lincoln was nominated for the Presidency, Senator Cameron was a favorite candidate for the first place on the ticket, and also for the second; but the Pennsylvania delegation was not agreed, and he failed of nomination. President Lincoln called him to his Cabinet as Secretary of War. When he served his second term in the Senate his loyalty was questioned on account of his advocacy of peace; but in the Cabinet he urged more aggressive measures than the President was prepared to sanction. He was in favor of arming fugitive slaves, and instructed General Butler to this effect. In January, 1862, he resigned his position and was sent as minister to Russia, where he helped in securing the friendship of that nation at this trying period. He resigned in November, 1862, and four years later was returned to the United States Senate. He was elected to a fourth term, but resigned in his son's favor in 1877. He was practically the Republican dictator in his state, and was called the "Czar of Pennsylvania Politics."

CAMERON, Verney Lovett, African explorer; born near Weymouth, England, in 1844; died March 26, 1894. He entered the navy in 1857, and served in the Mediterranean, the West Indies, and the Red Sea, and on the East Coast of Africa, taking part in the Abyssinian expedition and in the suppression of the slave trade. In 1872 (see Africa, Vol. I, p. 249), he was appointed to the command of an East Coast expedition to relieve Livingstone; and starting from Bagamoyo in March, 1873, in August, at Unyanyembe, he met Livingstone's followers bearing his remains to the coast (see Geography, Vol. X, p. 194). After making arrangements for their safe arrival, he proceeded to Ujiji, where he found some of Livingstone's papers and a map, which he forwarded to Zanzibar. He then made a survey of Lake Tanganyika, which he found to be disconnected with the Nile system. Taking a southerly route, he reached the Portuguese settlement of Benguela, on the West Coast, Nov. 7, 1875, thus being the first European to cross Africa from east to west, and returned to England. Created a commander of the Bath and raised to the naval rank of commander in 1878, he traveled overland to India, and in 1882, with Sir Richard Burton, he visited the Gold Coast.

Among his works are *Across Africa* (1877) and *Our Future Highway to India* (1880).

CAMERONIAN REGIMENT, a name given to the Twenty-sixth Regiment of British infantry, which had its origin in a body of Cameronians. In 1689 the convention at Edinburgh, taking advantage of the zeal and courage of the members of this religious body, induced a number of them to assist in the Revolution, on the understanding that the special object of the corps was to recover and establish the work of reformation in Scotland. The regiment, with the youthful Lord Angus as colonel and William Cleland, the poet, as lieutenant-colonel and actual commander, was sent northward to quell the insurrection. On Aug. 21, 1689, the Cameronians, 1,200 strong, defended themselves against 5,000 Highlanders, and although Cleland fell early in the fight, his work was accomplished; for, in Macaulay's words, "the Cameronians had finished the war." See CAMERON, RICHARD, Vol. IV, p. 742.

CAMERONIANS, a religious body in Scotland, followers of Richard Cameron, officially called Reformed Presbyterians. In 1681, societies were organized bearing the names of the districts to which they belonged, for the purpose of defense against the oppression of the government, and for the maintenance of worship. They refused to accept the indulgence granted to the Presbyterian clergy in the times of Charles II (see PRESBYTERIANISM, Vol. XIX, p. 684), lest by accepting they should be understood to recognize his ecclesiastical authority. The political position of the Cameronians was very peculiar, since, declining to recognize any laws or institutions which they conceived to be inimical to those of the kingdom of Christ, they refused to take the oath of allegiance. In 1860 there was an attempt to prevent the members exercising the franchise, but in 1863 it was decided not to exercise discipline to the extent of suspension and expulsion on such questions. In consequence of this decision, to which the majority adhered, 10 or 12 congregations seceded. In 1876 the larger body, known as the Reformed Presbyterian Church of Scotland, formally united with the Free Church. The principles of the Cameronians are now, therefore, distinctively represented by the few congregations which seceded in 1863. See, for an account of the founder, CAMERON, RICHARD, Vol. IV, p. 742.

CAMEROON, a German colony on the West Coast of Africa, extending along 15° E. long. from the Cross River to the mouth of the Rio del Rey, below 3° N. lat. The name is derived from the Cameroon River, which enters the Bight of Biafra, opposite Fernando Po, by an estuary over 20 miles wide. The stream is for a considerable distance nearly a mile broad, has at some seasons a current of five miles an hour, and its yellow waters may be traced far out at sea. The country is very fertile, abounding in ebony, redwood and palm trees, and a variety of tropical fruits, while the production of cotton and ivory is very considerable. More recently plantations of tobacco and cacao have been established. The climate is very trying to Europeans, and traders generally live in hulks, and only store their goods on shore. The natives belong to the Bantu group. Their kings, Bell and Akway, practically wholesale merchants, made considerable trouble by their refusal to permit the natives of the interior to trade directly with Europeans. As England declined to assume the protectorate, the Germans were appealed to, and on July 14, 1884, the German flag was hoisted at Cameroon and a governor appointed. An agreement was concluded in April, 1893, settling the boundary between the territory and the Niger Coast Protectorate. In the same year a German expedition, under Baron Uechtritz, arrived at Yola, on the River Benué, and were received by the Emir in the most friendly manner. The district covers an area of about 190,000 sq. miles, and the population is estimated at about 3,500,000. In 1897 there were 253 whites, of whom 181 were Germans. In 1895–96 the revenue was about $280,000; expenditure about $332,000. The chief town is Cameroon. See CAMEROONS, Vol. IV; also AFRICA, in these Supplements.

CAMILLA, a town, capital of Mitchell County, southwest Georgia, 26 miles S. of Albany, on the Savannah, Florida and Western railroad. Population 1890, 866.

CAMLET, properly a fabric made from the hair of the Angora goat. It is also made wholly of wool, or of wool mixed with cotton or linen, and spun hard. Marco Polo mentions the fabric as among the products of Tibet. The cloth is still made in the Afghanistan countries. The imitation is made in England and America.

CAMOMILE-FLOWERS. See CHAMOMILE, Vol. V, p. 384.

CAMORRA, the name of a secret society in the former kingdom of Naples, under the Bourbon government, the members of which were called "Camorristi." It was first publicly known about 1820. It had a central rendezvous in every large provincial town, and twelve such in the city of Naples; and for each of these sections there was a chief, with powers of absolute command, and a treasurer with charge of the common fund. This organization, partly political and partly of the nature of a standing vigilance committee, plundered and terrorized the country for many years. It was tolerated under King Ferdinand II, for political reasons, but the government of Francis II endeavored to put down the society, and the police received instructions to seize and transport all known members of it. Those who remained entered into alliance with the Garibaldian committee, and essentially aided in the expulsion of the Bourbons. The organization still retains a nominal existence, but is of no importance.

CAMPANULA ("a little bell"), a genus of plants of the family *Campanulaceæ*, including the bluebell or harebell, the canterbury-bell, etc. Commonly called "bell-flowers" in the United States. See HAREBELL, Vol. XI, p. 478.

CAMPANULARIA, a common genus of hydroids and type of a family, *Campanularidæ* (see HYDROZOA, Vol. XII, p. 561). The delicate steam bearing the colony of polyps may be simple or branched; the nutritive individuals are surrounded by transparent, bell-shaped sheaths, within which they may be retracted. The genus is common in north European seas and in the Mediterranean.

CAMPARDON, Émile, French author; born in Paris, July 18, 1834; since 1884 chief of the bureau of legislature and judiciary in the office of the Archives of the Empire; received the decoration of the Legion of Honor in 1888. His writings relative to the eighteenth century and the French Revolution are the most important of his works. Among these are *Histoire du Tribunal Révolutionaire de Paris; Madame du Pompadour et la Cour de Louis XV; Voltaire, Documents Inédits; L'Académie Royale de Musique au XVIII^e Siècle;* and, in conjunction with M. Boutaric, *Les Mémoires de Frédéric II*

CAMPBELL, an ancient and illustrious Scottish family, to which genealogists have chosen to assign an Anglo-Norman origin, deriving its surname from the Latin *De Campo Bello.* According, however, to the Duke of Argyle, it is purely Celtic, of Scoto-Irish origin; and *Cambel,* as the name was always formerly written, is just the Celtic *cam beul,* "curved mouth." See Argyleshire, Vol. II, pp. 498–500.

CAMPBELL, Alexander, an American divine; born at the historic Shane's Castle, County Antrim, Ireland, Sept. 12, 1788; died in Bethany, West Virginia, March 4, 1866. He was educated at Glasgow University. His father, Thomas, came to this country in 1807, and ministered to destitute congregations in western Pennsylvania. Following his father in 1809, he became pastor of a Presbyterian church in Washington County, Pennsylvania. The father and son became dissatisfied with Calvinistic doctrines, and in 1810 organized a church at Brush Run, Pennsylvania, whose creed was the Bible and whose form of baptism was immersion. Alexander Campbell in 1827 organized the church which is variously called "Disciples of Christ," "Christians," "Church of Christ," and "Campbellites." The sect increased in numbers, and in 1880 had a membership of 500,000. Its founder was in 1823 the editor of *The Christian Baptist,* afterward called *The Millennial Harbinger.* Mr. Campbell believed slavery permissible to Christians, and according to Scriptural authority. He wrote much for the religious press, and published many religious books, among which are *Christian System; Living Oracles; Christian Baptism: Its Antecedents and Consequents; Lectures on the Pentateuch.* His published works number 60 volumes. In 1840–41 he founded Bethany College, of which he was the first president, holding this office until his death.

CAMPBELL, Sir Alexander, Canadian statesman; born in Yorkshire, England, in 1822; died May 22, 1892. He came to Canada when a boy, and in 1843 was called to the bar of Upper Canada. In 1856 he was created queen's counsel. He sat in the legislative council of Canada before the union. In 1867 he took office under Sir John Macdonald, first as Postmaster-General and afterward as Minister of the Interior. In 1878 he was Postmaster-General and Minister of Militia in the Liberal-Conservative administration. Entering the Senate he became leader of the government party in that body; in 1881 was made Minister of Justice, and in 1885 Postmaster-General. In 1887 he became lieutenant-governor of Ontario.

CAMPBELL, Bartley, an American dramatist; born in Allegheny City, Pennsylvania, Aug. 12, 1843; died in Middletown, New York, July 30, 1888. He began the study of law, which he relinquished, and became a *Leader* reporter. He founded *The Evening Mail* of Pittsburg in 1868, *The Southern Magazine* of New Orleans in 1867, and three years later was official reporter of the Louisiana house of representatives. He took up the writing of dramatic pieces in 1871, and among his plays are the following: *Through Fire; Peril; Fate; The Virginian; On the Rhine;* an adaptation of the German comedy *Ultimo,* which he named *The Big Bonanza; Heroine in Rags; How Women Love; My Partner; The White Slave; My Geraldine;* and *Paquita. The Big Bonanza* netted a San Francisco theater $16,000 in a month. *My Partner* achieved success in New York, being the first of Mr. Campbell's plays which gave satisfaction in that city. In 1886 the author became insane.

CAMPBELL, Douglas, lawyer; born in Cherry Valley, New York, in 1839; died in Schenectady, New York, March 7, 1893. He was graduated at Union College in 1860; took part in the Civil War, attaining the rank of major; began the practice of law in New York City in 1866. He retired from active practice a few years before his death. He published *The Puritan in Holland, England and America: An Introduction to American History.*

CAMPBELL, Douglas Houghton, an American botanist; born in Detroit, Michigan, Dec. 16, 1859; was graduated at the University of Michigan and studied in Germany, at Bonn and Tübingen; from 1888 to 1891 professor of botany at Indiana University; later at Stanford University as professor of botany. He has published, among other writings, *The Development of the Ostrich Fern; Elements of Structural and Systematic Botany;* and *Mosses and Ferns,* which appeared in 1895, and is taken as an authoritative work on that subject.

CAMPBELL, Sir George, British statesman; born in 1824; died in Cairo, Egypt, Feb. 18, 1892. He entered the service of the East India Company in 1842; held several important offices in India, among them that of chief commissioner of the Central Provinces; in 1871 was appointed lieutenant-governor of Bengal; in 1875 entered Parliament. He published several successful works, including *Modern India; White and Black in the United States;* and *The British Empire.*

CAMPBELL, George Washington, an American statesman; born in Tennessee in 1768; died in Nashville, Feb. 17, 1848. He graduated at Princeton in 1794; served in Congress from 1803 to 1809 as Representative, and from 1811 to 1814 as Senator; became Secretary of the Treasury in 1814; elected to the Senate in 1815; was appointed minister to Russia in 1818; and appointed a member of the French Claims Commission in 1831.

CAMPBELL, Helen Stuart, an American authoress; born in Lockport, New York, July 4, 1839. She was educated in Warren, Rhode Island, and at Mrs. Cook's Seminary in Bloomfield, New Jersey. She began at an early age to contribute sketches to the newspapers, and made a study of the housekeeping problem, employments for women, and the condition of the poor in cities. Among her books are

Unto the Third and Fourth Generation; The Problem of the Poor; Mrs. Herndon's Income; What-to-do Club; Under Green Apple Boughs.

CAMPBELL, JABEZ PITT, an African Methodist Episcopal bishop, born in Sussex Co., Del., Feb. 5, 1815; died in Philadelphia, Aug. 9, 1891. He was not a slave, but when a boy was mortgaged by his father, and escaped to Philadelphia, where he was educated; entered the ministry in 1837; was very successful, preaching in pulpits in all the larger cities of the United States; was consecrated bishop in 1864; in 1887 was bishop of North Carolina, Virginia, and Maryland; made several visits to Europe, representing the African Methodist Church in important international Methodist conferences. To him is attributed much of the success of his Church.

CAMPBELL, JAMES, an American public man; born in Philadelphia, Pennsylvania, Sept. 1, 1812; died there, Jan. 27, 1893. He became a lawyer; was judge of the court of common pleas from 1841 to 1850; attorney-general of the state in 1852; and appointed Postmaster-General in 1853.

CAMPBELL, JOHN ARCHIBALD, an American jurist; born in Washington, Georgia, June 24, 1811; died in Baltimore, Maryland, March 12, 1889. He graduated at the State University in 1826, and was admitted to the bar by special act of legislature, as at the time he passed his legal examination he was a minor. Upon removing to Montgomery, Alabama, he practiced law, and frequently sat in the legislature. President Pierce gave him the appointment of associate justice of the United States supreme court, and this office he held from 1853 to 1861. He believed in the right of secession, but opposed the Civil War. Under the Confederacy he was assistant secretary of war. The Peace Commission of February, 1865, which met at Fortress Monroe, numbered him as one of the Southern representatives. After the Confederacy had been abolished, he was arrested and detained in Fort Pulaski; when discharged he resumed the practice of law.

CAMPBELL, JOHN FRANCIS, Scottish folk-lorist; born at Islay, Scotland, Dec. 29, 1822; died at Cannes, France, Feb. 17, 1885. Educated at Eton and the University of Edinburgh; he held offices at court, and was afterward secretary to the lighthouse and coal commissions. Much of his life was spent in travel. He was an enthusiastic Highlander, a profound Gaelic scholar, and a man of singularly lovable nature. An obelisk was raised to his memory in 1887 on the summit of Choc-na-Dab, a hill in Islay, near his birthplace. Campbell's great work is his *Popular Tales of the West Highlands* (4 vols., Edinburgh, 1860–62), a very important contribution to the scientific study of folk-tales. He gave much attention also to scientific studies, and published several scientific works.

CAMPBELL, JOHN MCLEOD, Scottish theologian; born at Kilninver, in Argyle, in 1800; died at Roseneath, Feb. 27, 1872. Sent to Glasgow University at the age of eleven, he was licensed to preach by the presbytery of Lorne in 1821, and was ordained minister of Row, near Helensburg, in 1825. His views on the personal assurance of salvation and on the universality of the atonement brought upon him a charge of heresy, which led to his deposition by the General Assembly in 1831. (See SCOTLAND, Vol. XXI, p. 538.) For 26 years he preached quietly, without remuneration, to a regular congregation that gathered round him in Glasgow. His health failing, the remainder of his life was spent in retirement. In 1868 his university gave him the degree of D.D., and in 1871 a testimonial and address were presented to him by men of nearly every religious denomination in Scotland. He was the author of three of the most valuable of modern English theological books: *Christ the Bread of Life* (1851); *The Nature of the Atonement* (1856); and *Thoughts on Revelation* (1862).

CAMPBELL, LEWIS, Greek scholar; born Sept. 3, 1830, in Scotland; educated at Glasgow and Oxford universities; was tutor in Balliol College under Professor Benjamin Jowett; ordained a minister of the Church of England in 1857; appointed professor of Greek in the University of St. Andrews in 1863. He has edited and published numerous works on classical subjects, among which are *The Theætetus of Plato; Sophocles; Plays and Fragments;* contributed the articles on Plato and Sophocles in the ENCYCLOPÆDIA BRITANNICA, and has written many papers for British and foreign periodicals.

CAMPBELL, THOMAS, clergyman; born in Ireland, Feb. 1, 1763; died in Bethany, West Virginia, Jan. 4, 1854. The Campbells of Argyle were his ancestors. He studied at Glasgow University, and was trained for the ministry under the Scottish establishment. Soon after becoming a minister, he joined the "seceders," and then sailed for the United States. He identified himself with the Associate Synod of North America and assumed the care of destitute churches in western Pennsylvania. His son joined him in 1809, and thereafter the two were united in church work, organizing the "Disciples of Christ," or "Campbellites." He labored to assist his son until blindness and the infirmities of age obliged him to give up work.

CAMPBELL–BANNERMAN, HENRY, British statesman; born Sept. 7, 1836, and was educated at the University of Glasgow and at Trinity College, Cambridge. In 1872 he assumed the additional surname of Bannerman, under the will of an uncle. He has represented the Stirling district in the Liberal interest since December, 1868; he was financial secretary at the War Office in 1871–74; and again in 1880–82; and in May, 1882, was nominated to succeed Mr. Trevelyan as Secretary to the Admiralty. On the resignation of Mr. Trevelyan he was appointed Chief Secretary for Ireland, 1884–85; and in Mr. Gladstone's third cabinet, 1886, held the office of Secretary of State for War, a position to which he was again called on the return of his chief to power in 1892. He occupied the same office in the Rosebery cabinet of 1894–95. Soon after he was again elected M. P. for the Stirling district; and on Feb. 6, 1899, on the retirement of Sir William Harcourt, he was chosen leader of the Liberal party in the House of Commons.

CAMPBELLITES, the popular name for a religious order founded in 1811 by Alexander Campbell. See DISCIPLES OF CHRIST, in these Supplements.

CAMPBELL ISLAND, a lonely spot of volcanic origin to the south of New Zealand, discovered in 1810 by the captain of a whaling-vessel, who gave it the name of the owners of his vessel. It is in lat. 52° 34′ S., and long. 169° 62′ E. It was used as an observatory during the transit of Venus in 1874. Though it is mountainous, portions rising to a height of 1,498 feet, and measures only 36 miles around, it has valuable harbors and a rich and rare flora.

CAMPBELL'S STATION, a hamlet of Knox County, southeast Tennessee, 12 miles S.W. of Nashville. Here, in November, 1863, the Union forces under Burnside defeated the Confederates under Longstreet.

CAMPBELLSVILLE, a town, capital of Taylor County, central Kentucky, 18 miles S. of Lebanon, on the Louisville and Nashville railroad. Tobacco warehouses are here. Population 1890, 1,018.

CAMPBELL WEB PERFECTING PRESS. See PRINTING-PRESSES, in these Supplements.

CAMPHILENE, an artificial variety of camphor obtained from turpentine, by acting thereon with the dry vapor of hydrochloric acid, and keeping the whole at a low temperature by immersing the vessel in a freezing mixture. A solid substance is produced which separates in white crystalline prisms, and has the taste and agreeable aromatic smell of common natural camphor.

CAMPHINE OR CAMPHENE, a term applied in commerce to purified oil of turpentine, obtained by carefully distilling the oil over quicklime, or by rectifying it over dry chlorid of lime to render it quite free from resin. It was formerly much used for fluid in lamps, but being very volatile, and when mixed with air very explosive, it was discarded as soon as kerosene was introduced.

CAMPIDOGLIO, PALAZZO DEL, the name of a palace in Rome which stands between the palaces "of the senators" and "of the conservators." These three palaces were built by Della Porta, but designed by Michael Angelo. They stand upon the place once occupied by the ancient capitol. In its construction were used colossal columns which extend the height of two stories, and which are best expressed in the architectural term *colossal order*.

CAMPINAS, SAN CARLOS DE, a city of southern Brazil, situated on a fertile plain, 44 miles N.W. of of São Paulo. There are large coffee and sugar plantations in the surrounding district. Population, 35,000.

CAMPION, the common name of plants belonging to the genera *Lychnis* and *Silene*, of the family *Caryophyllaceæ*, to which family belong, also, the common "pinks." The common "campions" of the United States are *S. stellata*, "starry campion," and *S. inflata*, "bladder-campion."

CAMP-MEETINGS, gatherings of religious organizations, held usually in thinly populated districts, and generally continued for a week or more, with a view of securing prolonged and uninterrupted religious exercises. Assemblies of like kind have been more or less usual at various periods in the history of the Christian Church; but it was in connection with Methodism in America that such meetings became especially prominent. The practice of holding such meetings originated in 1799, and is still common. Lorenzo Dow introduced the system of camp-meetings in England about 1801, which led to the formation of the Primitive Methodist Society.

CAMPOAMOR, RAMON DE, Spanish poet, philosopher and statesman; born in Navia in 1817; went to Madrid to study medicine, but devoted himself to literature and politics; was appointed governor of Alicante and Valencia; was for several years a member of the Cortes, or government assembly. There he distinguished himself as an orator. After the revolution of 1868, in which he took part with the royalists, he became Minister of the Interior; upon the restoration of Alphonso XII he became Counselor of State. Among his published poetical works are *Ayes del Alma; Los Pequeños Poemas;* and *Oeuvres Poétiques*. Among his philosophical writings are *Filosofia de las Leyes; Polemicas con la Democracia;* and *El Idealismo*.

CAMPOBELLO, an island belonging to New Brunswick. It is situated off the coast of Maine, at the mouth of the Passamaquoddy Bay, about two miles from Eastport. It is 9 miles long, and from 1 to 3 miles wide. It is a popular summer resort, and contains some of the finest hotels on the coast. Lead and coal are found in the island. The chief industry is fishing. Population, about 1,200.

CAMPO DE CRIPTANA, a town of south-central Spain, in the province of and about 50 miles N.E. of the city of Ciudad Real. It has manufactories of coarse cloths, and some trade in corn and fruits. Population, 5,255.

CAMPO–FORMIO, a village of northern Italy, six miles S.W. of Udine, celebrated for the treaty of peace here concluded, Oct. 17, 1797, between Austria and the French Republic. See AUSTRIA, Vol. III, p. 131; also NAPOLEON, Vol. XVII, p. 200.

CAMPOS, ARSENIO MARTINEZ. See MARTINEZ-CAMPOS, in these Supplements.

CAMPOS, SÃO SALVADOR DOS, a city in the Brazilian province of Rio de Janeiro, 150 N.E. of Rio de Janeiro City; situated on the Parahyba, which is navigable for small craft to this point, 30 miles from its mouth. It has fine wharves, and considerable trade in coffee, sugar, brandy and timber. Population, 40,000.

CAMPUS MARTIUS, now the most crowded part of modern Rome. See ROME, Vol. XX, p. 807; also MARS, Vol. XV, p. 570.

CAMPVEER, a fortified town of the Netherlands, in the province of Zealand, in Walcheren Island, four miles N.E. of Middleburg. It has a port on the Veersche Gat, a tract of water separating Walcheren from North Beveland. The town is now in a state of deplorable decay, but it still possesses a splendid cathedral and remnants of its early prosperity. It has one calico factory. Historically it is one of the most interesting of Dutch towns. Here William III, Prince of Orange, was first proclaimed stadholder. Population, 900.

CAMTOOS OR GAMTOOS, a river of the east division of Cape Colony, Africa, 200 miles in

length. It rises in the Nieuwveld Mountains, and flows through the inland district of Beaufort, falling into the inlet of the sea which is immediately to the west of Algoa Bay. It was formerly the boundary between the Hottentot and Kaffir races, and was adopted by the Dutch as their eastern limit until the beginning of the Kaffir wars in 1811.

CAMUS, Armand Gaston, a bibliographer, prominent during the French Revolution; born in Paris, April 2, 1740; died Sept. 2, 1804. On account of his superior knowledge in ecclesiastical law he was elected advocate-general of the French clergy. He was a zealous and ascetic Jansenist, and possessed of extraordinary firmness of character. In 1789 he was elected to the States-General. He gained possession of and published the so-called *Red Book*, giving accounts of court expenditure, which was highly disadvantageous to the court and its ministers. In 1793, when he was commissioned to make prisoners of Dumouriez and other generals suspected of treason, he was taken prisoner with his colleagues and delivered to the Austrians. After an imprisonment of two years and a half, he was exchanged for the daughter of Louis XVI. On his return to Paris he was elected to the Council of Five Hundred, became its president in 1796, resigned a year later, and devoted his time to literature and the classification of books and libraries.

CAMWOOD or BARWOOD, a dyewood which yields a brilliant but not permanent red (see Dyeing, Vol. VII, p. 576). It is the wood of *Baphia nitida*, a tree of the natural order *Leguminosæ*, suborder *Cæsalpinieæ*, a native of Angola and Sierra Leone.

*CANADA. The political, economical and social progress of Canada in the past two decades, together with the development of her institutions and the increase of her resources, call for important additions to the article on the Dominion to be found in Vol. IV, pp. 765–782 of this Encyclopædia. Almost thirty years have elapsed since the Confederation Act created the Canadian Dominion, and knit into a federal union the older provinces of the crown in British North America. Already, most of the "Fathers of Confederation" have passed away, including the conspicuous figures, Sir John A. Macdonald and Sir G. Etienne Cartier, the respective English and French leaders of the Tory government of the period, with most of the chiefs of the Liberal party that had coalesced with the Conservatives to bring about the union and remove the dead-lock of that time in the legislative machinery of the colony. Their great work, nevertheless, remains, and though all that was expected of the labor of their hands has not been realized, the young nation has since made great material advancement, and seen much accomplished in the strenuous work of unifying the once isolated and widely separated peoples that now constitute the Canadian Dominion.

The British North America Act went into force July 1, 1867, and two years afterward Canada extended her domain by the acquisition of the northwest, which for two centuries had been under the sway of the Hudson Bay Fur-Trading Company. Out of this vast tract she created the prairie province of Manitoba, and, later on, organized, under legislative machinery of its own, part of the great stretches of the northwest territory. In 1871, British Columbia, on the Pacific, and, in 1873, Prince Edward Island, in the Gulf of the St. Lawrence, became provinces of Canada, and completed the chain from ocean to ocean of the Confederated British American Colonies. Newfoundland (in 1896) still maintains its separate crown-colony organization, and, under it, exercises jurisdiction over the bleak coasts of Labrador. In area, though Canada has thus assumed the proportions of an empire, yet it is to be noted that while her southern boundary line is nearly 4,000 miles in length, the habitable portion of the country is necessarily limited by the rigor of the climate on the north. To this there is, however, an exception in the northwest, where the isothermal lines, in their westward sweep, widen the cultivable region in the newer portions of the Dominion. This latter fact, while it opens enormous areas for colonization, adds millions of square miles to the zone of grain-cultivation and cattle-raising, qualified, however, by the risks of early and late frosts and the expense of transportation to market.

With Canada, as with the United States, the question of transportation to and from the new and remote districts has been a serious one, since great is the cost of hauling, first to the through lines of railways, and then by the latter to tide-water, and in the case of Britain, of conveying to that distant market. In the northwest, the vast grain and herd raising region of the Dominion, indispensable facilities have been extended to it by the transcontinental enterprise, the Canadian Pacific railway, which was constructed between the years 1881 and 1886 at an outlay of one hundred and fifty million dollars, nearly one half of which was furnished by the Canadian government. This railroad, which forms a great national and imperial highway from sea to sea, has, with its connected systems, a mileage of 6,283 miles, and, with the Intercolonial, Grand Trunk, and other railways, gives the Dominion a total transport service of 16,550 miles. This vast network of railways is, in the main, the product of the last twenty years, for at confederation Canada had a railway mileage of only 2,258 miles, and in 1875 of less than 5,000 miles. The operations of the Intercolonial and the Grand Trunk railroads are chiefly confined to the older provinces. The Intercolonial is a government road 1,186½ miles in length, connecting the province of Quebec with the maritime provinces of Nova Scotia and New Brunswick. The Grand Trunk, which absorbed the old Northern and Great Western railroads, is a corporate organization, with ramifications throughout Ontario, a trunk line to Quebec, and a branch through United States territory to the seaboard at Portland, Maine. It has a total track of 3,162 miles. In addition to this extensive railway system, Canada has a valuable trans-

* Copyright, 1897, by The Werner Company.

port service in her canals, on which she has expended, on works and maintenance, close upon $75,000,000, two thirds of which have been disbursed since confederation. These canals, 75 miles in length, overcome the obstacles to navigation on the St. Lawrence system. The main expenditure on the canal has been incurred in enlarging the Lachine and Welland, and in constructing the new Sault Ste. Marie locks. Great as has been the cost of these undertakings, they have been, and still are, of incalculable material service to the country, and a valuable offset to reciprocal privileges enjoyed by Canada in the United States.

The improved waterways of Canada have naturally extended her inland shipping and coasting trade, while the enterprise of her people and their increased wealth have developed, also, her commercial marine, which now ranks fourth among the chief trading nations of the world. Shipbuilding has always been a large branch of industry in Canada, and her hardy sons in the maritime provinces have made the best of sailors. Since the construction of iron-built vessels, Canada's trade in wooden ships has somewhat fallen off, but despite this, and the extension of the railways, the tonnage of her vessels engaged in the coasting, inland and sea-going trade is large. The total number of vessels on the registry books of the Dominion on the 31st of December, 1895, was 7,262,, with a gross tonnage of 2,825,837 tons. In 1896 she began to improve her sea-going mail and postal service across the Atlantic; and of late years she has, through the enterprise of the Canadian Pacific railroad, established an admirable line of passenger steamships between Vancouver and China and Japan, and Vancouver and Australia. The Canadian Pacific railway has also a good steamship service between Owen Sound, on the Georgian Bay, and Port Arthur, at the head of Lake Superior.

While the material strides of the colony have to be admitted, the dispassionate onlooker who really knows Canada has, however, to keep his enthusiasm in check when dealing with what is gratifying in the country's progress, since there are many features of the situation which discount the advancement that has been made, and qualify one's estimate of the present status and immediate future of the Dominion. These, at the outset, may briefly be glanced at, since they explain why Canada, with the vast extent and great resources of the country, and with a thrifty and industrious though sparse people, has not made still greater gains. The chief drawback from which Canada obviously suffers is her rather rigorous northern climate, her political and economical isolation from the continent of which she is a part, and her proximity, along 3 000 miles of inviting frontier, to the attractions of a populous, wealthy and progressive nation. Of these retarding influences, Canada's contiguity to her great southern neighbor, which makes heavy annual drains upon the flower of her population, is doubtless the most serious, aggravated hitherto by an artificial, and for a limited population an unwise, policy of protection, which imposes a high tariff, and vastly increases the burden of taxation. Other manifest drawbacks are the large and rapidly mounting debt of the Dominion, due in part only to expenditure on public works, and the fact that the country, which is not only under-populated but over-governed, is becoming a dear one to live in. These matters, as we have hinted, have to be taken into account in appraising Canada's present circumstances, and in seeking intelligently to understand the political and economical situation, which in time, doubtless, she will happily outgrow.

Another disadvantage from which Canada, in addition to being over-governed, in some respects suffers lies in the divided and unassimilated race and religion which make up her population, and introduce into her politics the sinister elements of discord and even conflict. The effect of this is seen in the Jesuits' Estates imbroglio, and in the recent strife in Parliament and the country over the Manitoba separate schools question, as it has been seen all along in the history of the two nationalities, and their opposing interests of race and creed, back to the era of the Conquest. Party antagonisms and the fierceness of the political game intensify the bitterness between the two races, and increase the difficulty, as they enhance the cost,—often by corrupt means,—of governing. This untoward state of things naturally retards the progress, as it postpones indefinitely the unification, of the Dominion, and more particularly so when the guiding hand at the helm of affairs is not strong and the art of governing is either impolitic or unskillful. In spite, however, of these anti-national phases in the political life of the country, Canada has made great constitutional and material strides, and accomplished much in setting the colony on its feet and smoothing the path of progress. With an added million or two to her population, if meantime the country does not swamp herself with debt, the national outlook will be less grave, and the aspiration of her people become more hopeful and buoyant. Her debt, however, is large for her small population (in 1891 the population was only 4,833,239); and though there is much to show for the debt, still the growth of population is slow, and a net debt which has grown from $75,000,000 at confederation to over $261,000,000 in 1897, is, with annual deficits and an inelastic revenue, a seriously retarding burden.

The total area of the Dominion is 3,653,946 square miles, of which close upon 606,000 square miles are water surface, while 250,000 square miles (approximately) consist of heavily timbered forest, besides large tracts of young woodland. From the forest resources of the country, which consist chiefly of spruce and pine, and in British Columbia of yellow cypress, Douglas fir and giant cedar, Canada derives an annual revenue, inclusive of the wooden products of the factory, of nearly thirty million dollars. This vast aboreal wealth, which use and waste must, however, soon diminish, finds its way mainly to the markets of England and the United States. A further im-

portant source of wealth in Canada is agriculture, including the products of the dairy and the farm. This wealth is derived from some twenty million acres under crop, out of a total of thirty million acres of improved lands. In addition to this, there were at the census of 1891 over fifteen million acres in pasture, and half a million acres in gardens and orchards. Relatively to the whole area of Canada, the area under crop and in pasture was, in 1891, about 10 per cent. In the agricultural pursuit, 45 per cent of the population, despite the hiving in cities in recent years, find a means of subsistence, as well as opportunities for accumulating wealth. The value of Canadian exports of wheat, flour and other breadstuffs was, in 1893–94, a little over twenty-one million dollars —a decrease in value of six million dollars, owing partly to the low price of wheat and partly to the loss of the American market for barley, in consequence of the high tariff. The McKinley tariff also affected the export to the United States of horses, though the loss has approximately been made good by the large exports to England of live cattle and sheep—a trade which has sprung up in the last ten years with the fitting out of steamers suited to the carrying trade, plying between Montreal and British ports. The returns for the year 1897 show a total export of 17,993 horses, 161,345 cattle, and 313,410 sheep, of the total value of $9,972,321. For the reason above stated, the egg and poultry trade with the United States has of recent years greatly declined, though the loss has been counterbalanced by a large increase in the exports to Britain of bacon, hams, pork, and lard. There has also been a phenomenal increase in the cheese exports to England, the yield from which has doubled in the last seven years. The returns from the export of this commodity in 1897 were in value $14,676,239. The value of the butter shipments was, for the year 1897, over $2,000,000, and that of eggs $978,479. Of hay there is also a considerable export, amounting in the year last named to over $2,500,000. Fruit of the hardier sort is also a considerable source of wealth, the export of apples being for the year 1897 over $2,500,000. The grape crop, which, however, is mainly gathered in Southern Ontario, was in 1891 over twelve million pounds' weight.

The Canadian fisheries, as is well known, are the most extensive in the world, and are now assiduously and profitably cultivated. The commercial value of the whole catch, embracing cod, herring, lobsters, mackerel, haddock and salmon, was for the year 1894 nearly twenty-one million dollars, or just double the value of the yield twenty years before. Roughly speaking, about half of the catch is exported. The fish trade of British Columbia, which is mostly of canned salmon, shows the greatest increase over that of all the other provinces. The value of the catch in the Pacific Coast province was, in 1876, a trifle over $100,000. In 1896 the value of the catch had risen to $4,183,999.

The mineral ores of Canada form another, and so far as they have been developed a valuable, source of economic wealth. Besides coal, petroleum, mineral manures, and minerals used as pigments, for building purposes and in certain chemical manufactures, the ores consist chiefly of iron, copper, nickel and lead, with some silver and gold. The two latter precious metals are, as yet, found very sparsely in Canada, the gold-bearing quartz lodes being limited in their area to the provinces of Nova Scotia and British Columbia, while silver finds its main area of production, so far as is yet discovered, in the region lying to the north and northwest of Lake Superior. The value of the annual output of these two great commodities in 1897 was: gold, $6,027,016; silver, $3,322,905. That of the entire mineral production of Canada was for the year 1897 $28,789,173, about one-fourth being the value of the coal yield. This, it will be seen, is quite a modest showing; but the mines of Canada, it must be remembered, have only recently begun to be developed, and that chiefly in Ontario, while the absence of a near market for iron ores, and the lack of facilities for smelting, have hitherto been retarding circumstances.

Colonization and the utilizing for agricultural purposes of the waste places of the country have seriously interfered with the peltry trade, which in Hudson Bay Company hands was formerly a great and valuable source of revenue. The area of the fur preserve is, however, yet large, though the extinction of animals whose furs are fashionable points to the ultimate doom of the trade. How large and profitable the trade still is may be seen from the following list, representing the chief peltry catch in Canada for the year 1894: Bear, 9,173; beaver, 46,779; fisher, 4,024; red fox, 15,810; lynx, 12,813; marten, 108,997; mink, 51,163; musquash, 648,687; otter, 7,444; seal, 44,086; wolf, 2,037.

Manufactures have of recent years become an extensive source of wealth in Canada, particularly since the adoption by the Dominion government, in 1879, of a protective tariff, otherwise known as the "national policy." The census of 1891 shows the number of industrial establishments of all kinds in the Dominion to be 75,968, with a gross working capital of $181,500,000. The value of the manufacturing output for the year 1891 was $476,000,000. The industries chiefly represented in these figures are: Brewing, sugar-refining, cheese-making; fish, meat, and fruit canning; flour, grist and saw milling; machines, tools, implements, boot and shoe making, clothing, cotton and woolen milling, furniture and house-building supplies, brick-making, ship-building, stove-making, and the construction of sewing-machines, pianos, organs and other musical instruments. The manufactured exports of Canada for the year 1897 amounted in value to $34,715,480, Great Britain and the United States taking the bulk of this, in about equal proportions.

Perhaps the best indications of the prosperity of Canada in the past twenty-five years are to be

derived from the growth of the people's deposits, as shown in the chartered and savings banks statements. In the chartered banks the total deposits in 1868 were under $34,000,000; in 1897 they were over $211,000,000. Within the same period Canada's bank capital had expanded from $30,000,000 to over $62,000,000, with liabilities, in 1897, of $252,660,708, and assets of $341,163,505. The deposits in the government, post-office, and other savings banks have since confederation increased still more. In 1868 the total deposits were only $5,000,000, while in 1897 they had mounted to close upon $64,000,000, or $12.33 per head of the population. Comparative statements of the capital invested during the last two decennial periods in the native loan and building societies also show a gratifying increase in public wealth. In 1874 the paid-up capital of these institutions was only $8,000,000; twenty-two years later (1896), the paid-up capital had expanded to $42,000,000. The total assets, at the latter period, of these institutions amounted to $143,000,000, with like liabilities. The statistics of the insurance companies of all kinds indicate similar progress, the total amount of premiums received by companies doing business in Canada for all forms of insurance having risen from $8,000,000 in 1882 to $21,000,000 in 1897, or over 150 per cent increase. The proportional shares in this increase are: Canadian companies, 48.4 per cent; United States companies, 27.8 per cent; and British companies, 23.8 per cent. The annual income from life-insurance premiums in Canada, for all companies, has risen from $1,250,000 in 1869 to $11,215,927 in 1897. Of these life premiums the Canadian companies received on an average 59 per cent; the United States companies, 31 per cent; and the British companies, 10 per cent. The native life companies doing business under Dominion charters returned in their statements for 1897 assets of $43,587,153, with $39,209,977 of liabilities.

The growth of the postal system since confederation is a further indication of progress, both in the area of settlement and in the volume of business expansion. In 1868 the number of post offices was 3,638; in 1897, the number had increased to 9,191. The government expenditure on the service increased within the same period from $1,000,000 to nearly $5,000,000, being at the latter date (1897) more than $500,000 in excess of the revenue. Canada's telegraphic facilities show like favorable extension; only eight countries in the world having, as statistics prove, a greater telegraphic mileage than the Dominion. Already extensive and rapidly developing is her system of cable communication. Canada, as the birthplace of the telephone, is also well equipped with this useful auxiliary of commerce. In 1894 she had 8,800 miles of wire for each million of her people, as against 4,700 miles for each million inhabitants of the United States.

We have said that the population of Canada, for its area, is still sparse, and that its growth is slow. The chief increase is in the prairie province of Manitoba, which of recent years has grown largely from the older settled portions of the Dominion. Of the total population in 1891, of 4,833,239, it is estimated that 100,000 are Indians, one-half of whom find their habitat in British Columbia, Manitoba, and the Northwest Territories. These native tribes, it is calculated, have reached the stationary limit in the census returns, save in the case of those who have become civilized and have taken to agricultural or other settled pursuits. Disease and the struggle for existence, now that colonization has narrowed their hunting grounds, knell the doom of the nomads. Of the whole population, 86.6 per cent are native-born, the percentage being largest in the older provinces. About 1,200,000 are French-speaking folk, and of the Roman communion. The religious denominations, as a rule, keep their relative numbers, the Roman Catholics having a membership equal to 41.21 per cent of the population. The Methodists come next in the race, with 17.54 per cent; the Presbyterians, with 15.63 per cent; the Church of England, with 13.37 per cent; and the Baptists, with 6.29 per cent.

At confederation, Canada established a Department of Militia and Defense, under a minister of the crown, with a British officer acting as adjutant-general. The Dominion is divided into 11 military districts, each under a permanent military staff. Besides a government military college (at Kingston, Ontario), there are small permanent corps and schools of instruction in the different arms of the service. The strength of these permanent corps is 1,000 men. In the several provinces there is an active militia land force of about 38,000 raised by voluntary enlistment. These are trained and drilled annually, at convenient seasons, the period of drill being from eight to sixteen days per annum. The reserve militia, which exists practically only on paper, includes all the able-bodied male inhabitants of Canada between the ages of 18 and 60. In the Northwest Territories there is an embodied mounted police force, 1,000 strong, for the preservation of peace and order, and the confiscation of intoxicating liquors held contrary to law. The annual militia expenditure is in the neighborhood of $1,250,000.

Under the Confederation Act each province of the Dominion manages its own educational affairs. The school statistics, therefore, where there is occasion to deal with them, will be found under each province.

The aggregate trade of the Dominion, which in 1897 was a trifle over $257,000,000, has varied much in the last twenty years, many of the years exhibiting a serious decline, while the increase within the period has been about 46 per cent. The total imports for the year 1897 were in value $119,218,609, while the total exports for the same year were $137,950,253. A little more than half the Canadian exports went to Britain, and about 60 per cent of the imports came from the United States. The volume of import trade almost invariably exceeds the value of the export trade. Only four times since confederation has

this rule has been reversed. The average annual value, per head of population, during the 30 years of confederation has been: Of imports, $25.03; of exports, $22.07; or $47.10 per head of a total annual trade. The percentage of dutiable goods, as against free goods, has within the same period varied from 59 to 82 per cent of the imports. The total duty collected throughout the Dominion on imports for the year 1897 was close upon $20,000,000. Of this, 43 per cent was collected on British imports, and 36 per cent on American. The difference is accounted for by the fact that nearly 51 per cent of American imports were free goods, principally raw material, while only 29 per cent of the imports from Britain were on the free list. The total trade of the colony with Great Britain in 1897 amounted to $113,800,878, and with the United States to $120,139,788, a fact which shows that proximity of market is almost as much a factor as sentiment.

The Dominion revenue, which, in the main, is derived from customs duties and excise imposts, has grown from $13,687,928 in 1868 to $40,555,238 in 1898. The expenditure in 1898 was $38,832,526, showing a considerable surplus for the first time in several years; though, taking the total amount since confederation, there has been an excess of revenue of over $20,000,000 in the whole era. The debt of the country has within the period advanced with giant strides, owing chiefly to expenditures on capital account, incurred for railway and canal construction and the assumption of provincial debts. Nearly $200,000,000 have been disbursed or raised by loans on these accounts. The gross debt of Canada, June 30, 1898, was $338,375,984, or, less the Dominion assets, $263,956,399 net debt, being $50.94 per head of population. This amount, it is true, is much less than the debt per head of the English people, and only about one-fifth of the debt per capita in the Australian colonies; but it is more than double the per-capita debt of the people of the United States, whose resources and money-making power are infinitely superior to those of Canada.

With the dissolution (midsummer, 1896), seven Parliaments have run their course since confederation,with seven successive ministries, though with but three changes of government. One of these changes occurred in 1873, when the Macdonald government, discredited by corrupt relations with a company of contractors who had offered to build the Canadian Pacific railway, was supplanted by a reform or Liberal administration, under the Hon. Alexander Mackenzie. The Mackenzie administration held office until 1878, when it was overthrown on a tariff question which then agitated the country. This was the question of protection to native industries, foreshadowed in what came to be called the "National Policy" of the succeeding Liberal-Conservative administration of Sir John Macdonald, though that redoubtable politician died in 1891, and has been succeeded in the premiership by four successive Tory chiefs. In June, 1896, the Conservative government of Sir Charles Tupper was beaten at the general elections by the Liberal party, headed by Sir Wilfrid Laurier, who became Premier. The cause of defeat was the opposition of the country to the policy declared by Sir Charles Tupper's administration to coerce Manitoba into restoring separate schools to the Catholic minority of that province. A significant feature of the change of party administration was the revolt of the electors of the French and Papal province of Quebec against the Roman Catholic priesthood, who, at the bidding of the bishops, had commanded their flock to vote for Conservative as against Liberal candidates, and this in spite of the fact that Sir Wilfrid Laurier, the leader of the Liberal party, was himself a Frenchman and a Catholic.

The more notable incidents in the annals of the era since confederation, in addition to those already referred to, are as follows: Early in the seventies, after the imperial government had transferred to the Dominion Rupert's Land and the Northwest Territories, the franchises of the Hudson Bay Company being purchased by Canada for $1,500,000, England handed over to the colony all fortifications and military and crown lands, excepting those at Halifax (Nova Scotia) and Victoria (British Columbia), at the same time withdrawing the imperial troops from the country. By an order in council in 1880, England also made over to the Dominion the islands of the arctic archipelago lying to the northward of Canada. In 1884 the boundaries between Ontario and Manitoba were defined by a decision of the Judicial Committee of the Privy Council of England; and, five years later, the Imperial Parliament extended and defined the boundaries of Ontario on the north, east, and west. In 1876 the Northwest Territories, which at first were placed under the jurisdiction of Manitoba, were given a separate government, consisting of a lieutenant-governor and council, with the seat of government at Regina. In 1882, the Territories were divided into the four districts of Assiniboia, Alberta, Saskatchewan, and Athabasca, and in 1886 were given representation in the federal Parliament. In the organization of the Territories, the sensitiveness of the native half-breeds was touched, and in 1885 the latter rose in revolt, under Louis Riel, and set up a provisional government. The rebellion was, however, suppressed by an armed expedition from the older provinces, consisting of Canadian militia, though at the cost of considerable blood and treasure, and Riel, the leader of the *émeute*, was hanged.

The hanging of Riel was bitterly resented by the French-Canadians, whose sympathies were actively with their misguided rebel countryman, and for a time there was a strained feeling between the two races and much political disaffection. Crises of this sort are unhappily not uncommon in the Quebec province, where the French nationalist feeling, incited by ambitious leaders, such as the Hon. Honoré Mercier, has of recent years been a menacing development. Racial antagonism and jealousies have been intensified

by Romish aggression and by the stimulus which the Ultramontane Church in Quebec has of late given to French ambition. The extent of the ecclesiastical domination was seen throughout the controversy over the Jesuits' Estates claims, which added $400,000 to the financial burdens of the French province, already almost swamped with debt, owing to the political corruption that has prevailed and the easy morals of men such as MM. Mercier, Senecal, and Chapleau. The feeling was further in evidence during the agitation all over the country on the Manitoba separate schools question, though the French hierarchy, in its attitude toward the discussion, had, in the recent election of Sir W. Laurier, whom the Church frowned upon in the contest, a significant rebuke. Nothing more advantageous to the country could well have happened than this rebuff received by the Church, and it is to be hoped that, with the purifying of politics in the French province, as well as in the Dominion at large, the event heralds the dawn of a better day.

In 1872, dual representation in the Dominion and the provincial Parliaments was abolished. In 1892, the legislative council of New Brunswick was wiped out of existence; and in the following year the legislative council and assembly of Prince Edward Island were merged into one body. In 1875 the supreme court of Canada was constituted. In 1880 the Royal Canadian Academy of Arts, and in 1881 the Royal Society of Canada, were founded. In 1877 the Halifax Fisheries Commission awarded $5,500,000 to Canada, to be paid by the United States for reciprocal rights in the fisheries; and eight years later, the United States terminated the fisheries clauses of the Washington Treaty. In 1893, the court of arbitrators respecting the seal fisheries in Bering Sea convened and declared their award. In 1895 the unorganized and unnamed portions of the Canadian Northwest were, by proclamation, given the following designations as provisional districts of the Dominion: Ungava, Franklin, Mackenzie, and Yukon.

Despite many disadvantages under which the country suffers, only optimistic can be the chronicler of Canada's recent development. On her people devolves the care of half a continent, whose resources are illimitable and whose capabilities are untold. In population, if Canada has not as yet the numbers that betoken progress, she has a country vast and productive enough to rear numbers. In her Northwest she has a belt of land which could provide sustenance, with plenty, for thirty or forty millions. In Manitoba and the organized districts of Assiniboia, Alberta, and Saskatchewan there are close upon 239,000,000 acres, which have been brought to the uses of the farmer and the ranchman to the extent of 7,832,200 acres. Included in this statement are the ranching-grounds, which, in 1895, covered 904,187 acres, distributed among 185 lessees. In Ontario alone, twice the present population of the whole Dominion could be comfortably housed and fed. Nor has the progress only been material. Besides the advance in wealth, and all that wealth has brought in its train, there has been a steady rise in the moral and intellectual status of the people. The gain in this direction is perhaps not all that the ardent patriot could wish, but the progress has been upward, and the ascent has not been that of a class merely, but of the people as a whole. In the national outlook there is, as Canadians themselves admit, not a little still to perplex and bewilder, but there is also much to encourage and inspire. G. MERCER ADAM.

CANADA BALSAM is a kind of turpentine obtained from the balm of Gilead fir (*Abies* or *Pinus balsamea*), a native of Canada and the northern parts of the United States. It exists, in the tree, in vesicles between the bark and the wood, and is obtained by making incisions, and attaching bottles for it to flow into. Canada balsam was formerly employed in medicine as a stimulant for the cure of mucous discharges, and as a detergent application to ulcers, but it is now rarely used as a remedy. The balsam is much valued for a variety of purposes in the arts—as an ingredient in varnishes, in mounting objects for the microscope, in photography, and by opticians as a cement, particularly for connecting the parts of achromatic lenses to the exclusion of moisture and dust. Its value for optical purposes is very great, and depends not only on its perfect transparency, but on its possessing a refractive power nearly equal to that of glass. See BALSAM, Vol. III, p. 293.

CANADA GOOSE, the common wild goose of North America (*Bernicla canadensis*). The plumage is gray, with black on head and tail.

*CANADIAN LITERATURE. Although the Dominion of Canada, in age, physical characteristics, race and spirit has had much in common with her great neighbor the United States, she has as yet produced no national literature. Writers she has had in abundance, some of them of rare excellence, but she has had no great, distinctively Canadian writer, no sharply defined literary movement, no northern school of poets or novelists or historians. Amid a great wealth of literary material, surrounded by the grandest of natural scenery, and looking back over a history full of romantic episode, especially in the early French period, the Canadian has had little encouragement for literary effort. He has never had the inspiration of a firmly united, independent fatherland. "A dependency can never be a nation"; and it is an axiom that literature can flourish only where the idea of independent nationality is firmly established.

In addition to this element of dependence there have been other serious impediments in the way of literary development. Despite the fact that the provinces are united in a confederacy under one executive and legislative head, much as are the United States, there is no real centralization. The Dominion lies in four widely separated sections: the maritime provinces; old Canada, including Quebec and Ontario; the prairie region, including Manitoba and the northwest territories;

*Copyright, 1897, by The Werner Company.

and British Columbia. While each of these communicates freely with the sections of the United States directly south of it, there is, owing to natural barriers, but little communication between the contiguous sections. The territory west of Ontario is as yet in its formative period, and is still too new for literary development. A history of Canadian literature must confine itself to the St. Lawrence valley and to the maritime provinces. But even within this restricted area there are almost impassable barriers to literary development. The provinces of Quebec and Ontario are separated by an antagonism both of race and of religion. Quebec is literally "a new France in the heart of English Canada," with a spirit, a religion, a language and a literature wholly unlike anything else in America. Its outlook, both in thought and literature, is toward France. Thus the Canadian writer can expect no audience of his countrymen outside of his own province. The book published in Toronto seldom reaches the maritime provinces, since Quebec lies as a barrier between, and there is no demand for it in the new northwest. These conditions have made it hitherto impossible for the literary magazine, that most important factor in literary development, to flourish. All Canadian writers, who have become at all known outside the limits of their own province, have been compelled to seek publishers in the United States, in England or in France.

Canada is as yet in her song period. Poetry is not widely popular among the masses of Canadian readers, yet from the first the bulk and the best of the literary product has been in verse. Aside from a few narratives chiefly valuable as sources of history, the Dominion is known to the literary world wholly from its lyrics. The earliest voices came naturally from the older sections about Quebec and the Lower St. Lawrence,—simple chansons sung by the French peasantry, lullabies and nonsense verses, rollicking boat-songs sung by hardy *voyageurs* and raftsmen, tender ballads of the *ancienne mère-patrie*, rippling love ditties, and wild drinking-choruses. The most popular of all these old chansons is *À la Claire Fontaine.* "All the people in Canada sing the *Claire Fontaine.* One is not French-Canadian without that."

Aside from a few historical narratives, the French have produced no valuable literary work outside the realm of song. There have been a few true poets, but no great original singer. All of them have kept carefully in tune with the voices of old France. The earlier poets, like Turcotte, Barthe, Derome and Garneau, were simply the Canadian exponents of the French school of 1830. The later group has been more national in its themes and its tones, and almost all of its members have belonged to the romantic school. Among its best representatives may be mentioned Octave Crémazie, Pierre Chauveau, Pamphile Le May, Louis Honoré Fréchette and Benjamin Sulte. Fréchette, who is easily the leading singer of French Canada, has taken his themes almost wholly from the national history. His sweet lyrics, published in collections, bearing such poetical titles as *Les Fleurs Boréales* and *Les Oiseaux de Neige*, won for him in 1880 the laurel crown of the French Academy.

English-Canadian literature is of comparatively recent date. Commencing with Mackenzie's narrative of his travels in British America, published in 1802, there have been published, from time to time, many native books dealing with the exploration and the history of the northwest and of Lower Canada. The stormy times preceding the union of 1840–41 called forth not a few trenchant political brochures, and many valuable studies of important periods in Canadian history have been made from time to time, but native works of a purely literary nature were almost unknown until after the confederation of 1867. Following this union, which had in it the promise of a united fatherland, there came a sudden outburst of literary activity, especially in the region known as Upper Canada, now Ontario. The first true English-speaking poet was Charles Heavysege, who published, in 1857, at Montreal, *Saul*, a drama, "one of the most remarkable English poems ever written out of Great Britain." Eight years later he published *Jephthah's Daughter*, a work full of imagination and feeling. Heavysege was not a native of Canada, and is Canadian neither in spirit nor in theme. It remained for Charles Sangster, a true poet of nature, to sing the first genuine songs in English of the Canadian woods and fields, of "the St. Lawrence and the Saguenay." He was followed closely by Alexander McLachlan, "The Canadian Burns," whose *Idylls of the Dominion* are fragrant with odors of forest and meadow, and musical with the heart-songs of his people. In the great choir of later singers a more extended mention should be given to Charles Mair, "The Northwest Poet," author of a drama entitled *Tecumseh*, and the singer of wild life on the prairie and the war-path; to Isabella V. Crawford, who died too early to reap the rich reward which her strong powers should have brought her; to E. Pauline Johnson, a young poet of rare promise, already the strongest singer that the Indian race has produced; to Archibald Lampman, who brings to his pictures of northern woods and pastures a rare classical spirit and culture; to K. Seymour McLean; to Ethelwyn Wetherald; to "Seranus" (S. F. Harrison); to Duncan Campbell Scott; and to many another. Another English-speaking poet worthy of mention is John Reade of Montreal, whose *Merlin and Other Poems* has the Tennysonian grace and sweetness, combined with a striking originality.

Of the maritime provinces, New Brunswick has become of late the literary center. The little school of poets headed by Charles G. D. Roberts, Bliss Carman, Barry Stratton and William W. Campbell is one of the most promising groups in literary America. Roberts, with his sweet, perfect lyrics, full of pictures of the marshes and uplands of his native coast, is now the unchallenged leader of northern song. His best work is in his *Orion and Other Poems* (1880) and his *In Divers Tones*, books distinctively Canadian in spirit and

scene. The leading singer of Nova Scotia is perhaps Arthur J. Lockhart, while Prince Edward Island has for its laureate John Hunter-Duvar, the author of many graceful lyrics of island life and scenes.

Notwithstanding the fact that the Dominion, with its varied population and conditions, has in its history, its social life and its scenery a rich mine of materials for fiction, there has as yet been produced no Canadian novel of even second rank. James De Mille, a native of New Brunswick, and author of the widely popular *Dodge Club in Italy*, wrote little that was distinctly Canadian. Five or six names exhaust the list of writers who have written novels that are read outside of Canada. The leading novelist of French Quebec is M. Joseph Marmette, whose historical romances, *L'Intendant Bigot* and *Le Chevalier de Mornac* have found considerable favor in France. Among other French historical novels may be mentioned De Gaspé's *Les Anciens Canadiens*, and Bourassa's *Jacques et Marie*, a story treating of the expulsion of the Acadians. Of English novelists, only the names of Major Richardson, Miss Machar ("Fidelis"), William Kirby, John Lesperance, Gilbert Parker, and the joint authors of *An Algonquin Maiden* need be mentioned.

In the field of historical literature Canada has produced several notable names, chief among which are those of Judge Haliburton, better known under his humorous sobriquet of "Sam Slick," whose *Historical and Statistical Account of Nova Scotia* is a standard work; James Hannay, whose *History of Acadia* has taken a leading place, and Goldwin Smith, who, with many works, both historical and political, has made himself the leading prose writer of Canada.

Dr. William Kingsford is now writing at considerable length a *History of Canada*, which is a painstaking and detailed narrative, though lacking in the attractive qualities of literary style. Eight volumes of the work have appeared, which bring the annals down to the War of 1812. Another work, useful for consultation, and of which a new edition has recently been published, is Macmullen's *History of Canada*. It is written from the Liberal standpoint. Dent's *Canadian Rebellion;* the same writer's *Last Forty Years;* Goldwin Smith's *Canada and the Canadian Question;* Parkin's *The Great Dominion;* Grant's *Picturesque Canada;* and Adam's *The Canadian Northwest*, are worthy additions to historic literature. Biography has also made additions of more or less merit to native letters, the more notable works dealing with political memoirs and reminiscences. Science has also enlisted its writers, as have education, law and religion.

The future of Canadian literature is hard to predict. It depends on the future history of the Dominion itself. The weakness of its past has come from its sense of dependence, its lack of self-reliance, its want of centralization. With a firmly united, independent government there would come at once an outburst of literary activity, for which the literature of the past has been but the preparation, and Canadian literature would soon take an established place beside that of the United States. F. L. PATTEE.

CANADIAN RIVER, called also the Red River, a stream 900 miles in length, rising in northwestern New Mexico, flowing through Texas, Indian Territory and Oklahoma, and joining the Arkansas 50 miles W. of Fort Smith.

CANAJOHARIE, a village of Montgomery County, central eastern New York, situated on the south bank of the Mohawk, 55 miles W. of Albany, on the West Shore railroad. It is the seat of an academy, and contains manufactories of paper bags, malt, and lumber. A bridge across the Mohawk connects it with the village of Palatine Bridge. Population 1890, 2,089.

CANAIGRE, a species of dock (*Rumex hymenosepalus*) indigenous to western Texas, Arizona and New Mexico. Its root is used in tanning. These roots vary in weight from a few ounces to a pound. In its habit of growth it resembles the sweet potato.

*CANAL. The construction of canal systems as the controlling instrument in internal transportation was characteristic of the development of this country during the first half of the century. The opening up of the railway period checked further construction, especially in new territory, and occasioned the abandonment of a considerable mileage of canals, much of which was badly located and of limited capacity; still, many works were carried to completion, some new enterprises were entered upon, and the capacity of old canals increased, and the completion of some of the old systems was strongly urged as late as 20 years ago. It is probable that had railway development been deferred 20 years, canals would have so far determined industries and localized commercial routes, that they would have persisted better and been enlarged with the growing necessities of commerce, as has actually occurred with the earlier canals, and ere this their unification in a general system, with a standard type of prism and lock, would have been under way.

Such has been the history of the canal system of France, the unification of which was undertaken by the government in 1876, and although by no means completed, the growth of traffic and the development of industries has fully justified the large expenditures made. At the present time there are in process of improvement and development some eight thousand miles of internal water routes, about one third the railway mileage, on an area equivalent to the combined areas of Michigan, Indiana, Illinois and Wisconsin, and less adapted to water routes. However, the old type of canal may be said to have become obsolete within the last 20 years, and the present very active thought in regard to water transportation is along quite different lines, though hardly yet formulated in any generally accepted conclusions. The end will doubtless be better than to have developed by mere departures from old precedents in the improvement of canal systems, originally conceived under very different economic condi-

*Copyright, 1897, by The Werner Company.

tions, and when engineering resources were relatively meager. The same topographical conditions that located the original canal will largely determine its modern successor, and the same resources in mineral and vegetable products will govern its usefulness. It will be well, therefore, to review briefly canal development in this country.

This development was largely confined to the territory lying between the seaboard and the Great Lakes and upper Ohio River, and again to the region lying between the lakes and the Ohio and Mississippi rivers. New York's topographical situation favored canal location, and she led the way, with canals reaching from tidewater of the Hudson to Lake Erie at Buffalo, Lake Ontario at Oswego, and Lake Champlain at Whitehall, and, by the Richelieu River, the St. Lawrence between Quebec and Montreal. The lakes of the central part of the state were brought into the system, and laterals were built into the Black River valley north from Rome; into the Susquehanna valley via the Chenango canal from Utica to Binghamton and by the Chemung canal from Seneca Lake to Elmira; and into the Ohio valley by the Genesee canal from Rochester to the Allegheny River at Olean. Extensions were going on as late as 1870 to unite the system with that of Pennsylvania. With the exception of the Delaware and Hudson canal, the canal system was built and operated by the state. In its maximum extension, including the central lakes and interior rivers, it aggregated 1,188 miles. The non-paying laterals were abandoned in the 70's, and the system now aggregates 851 miles. Between 1838 and 1862 enlargement of the main canals took place, effecting 567 miles, and by popular vote in November, 1895, it was determined to expend nine million dollars in further enlargement. The system has been free since 1882.

Following New York's example, the territory to the south, including the states of Pennsylvania, New Jersey, Delaware, Maryland and Virginia, entered actively upon canal construction. Deep bays and tidal arms, as Chesapeake Bay, Delaware Bay and New York Bay, invited canals of a semi-maritime type, as the Delaware and Raritan, the Chesapeake and Delaware and the Albemarle and Chesapeake, and the enlargement of these for strategic purposes and the coasting trade is advocated. The mineral resources carried canals up the valleys far into the recesses of the mountains. Three lines were intended to reach the Ohio, and Pennsylvania actually constructed a line from Philadelphia to Pittsburg, by a combination of railway, canal and portage railway, by which boats were carried 50 miles, in sections, across the Alleghany Mountains from Hollidaysburg to Johnstown. This line gave rise to the Pennsylvania Railway Company, which still operates a part of the original canal system. The Chesapeake and Ohio canal extended up the valley of the Potomac to Cumberland, and a project was matured for an extension to the Ohio at Pittsburg as late as 1876. This canal was nearly destroyed by a flood a few years since, but was considered sufficiently valuable to be rebuilt. The James River and Kanawha canal extended to Buchanan, and plans for its extension across the mountains were matured in 1877. The canal has since been abandoned. The canal up the valley of the Susquehanna was designed to connect with the New York system and give a route from Chesapeake Bay to the northern lakes. This connection was never made, although the final link was under way in 1870.

The Morris canal extended from Jersey City across northern New Jersey to Phillipsburg. It was remarkable in the use of inclines for overcoming many high lifts across a precipitous country. The Lehigh navigation made use of bear-trap dams, which were lowered in floods, and this idea was carried to France, and gave rise to very extended river improvements in that country and Germany. Various modifications and adaptations were made, and these have been re-imported within the last 20 years. The principles developed by the engineers who projected the Morris canal and the Lehigh navigation are destined to extended future application. Throughout the territory, 1,586 miles of canal were developed, 899 miles of which are still in actual service. Some of the lines were abandoned without proper justification.

In the territory lying between Lake Erie and the Ohio River, lines were carried from Lake Erie, at Erie, Pennsylvania, and at Cleveland and Toledo, Ohio, reaching the Ohio at Beaver, Pennsylvania, Marietta, Portsmouth and Cincinnati, Ohio, and Evansville, Indiana. Five main lines crossed the territory, and these had many laterals. Two of these, the Pennsylvania and Erie and the Wabash and Erie, have been abandoned. All these canals belonged to the early type of small canals. Nearly all the routes have been reexamined within the last twenty years for canals of larger capacity, and a ship-canal is now being actively promoted through the territory between Cleveland and Erie and south to the Ohio River, so the abandonment of canals in this region was evidently a mistake. The aggregate mileage of the various canal systems was 1,624 miles, 708.5 of which are still in service.

In the territory lying between Lake Michigan and the upper Mississippi River, Illinois projected a route by the Illinois River and built a canal from Chicago to La Salle, and deepened the summit-level so as to feed the same from Lake Michigan, in 1866–71. A proposed branch from Hennepin to Rock Island is now being built by the general government. The Kankakee valley branch, designed to reach Lake Erie by the Wabash and Erie route, has been abandoned.

Wisconsin projected the Fox-Wisconsin route and carried it out as far as Portage. The works are now being maintained by the general government. The Illinois and Wisconsin canals have a length of 369.4 miles in operation and under way, and 21 miles have been abandoned.

Kentucky undertook many important works in

the way of canalizing rivers, as the Kentucky and Green rivers, but constructed no canals of the ordinary type. These are in active service, and in recent years there has been a notable increase in the mileage of canalized rivers in the Ohio basin. At the present writing there are 646 miles of rivers improved by locks and dams, many of the movable type. Only 94 miles have been abandoned, and these were very inadequately carried out. The Illinois River has been canalized for 227 miles, and a few minor works give 10.6 miles more in the upper Mississippi basin.

New England executed 133 miles of work, of which 13.5 miles are in use. In the South, 168.3 miles were developed, of which 75 were abandoned, mostly of a small class. New works are being carried out in several localities in the way of canalizing rivers and overcoming abrupt ascents. The Pacific Coast has but two short canals, overcoming rapids, one on the Willamette and one at the cascades of the Columbia.

Canada has had an active canal policy from an early day. Among those first constructed were the ordnance canals for military purposes. They consisted of three short canals, around rapids of the Ottawa River, by which Ottawa is reached, and thence the Rideau canal, 126¼ miles to Kingston. The Trent canal was intended to extend the system to Georgian Bay, and was partially opened up, and this is now being completed. The Rideau-Trent system aggregates 395 miles. What are known as the St. Lawrence canals consist of seven detached canals of an aggregate length of 72.8 miles, overcoming the rapids of the St. Lawrence and the ascent from Lake Ontario to Lake Erie through the Welland canal. The enlargement of this system has been under way since 1872, with many delays, and its completion is expected in 1898. The locks are 270 feet long and 45 feet wide, with 14 feet of water on the miter-sills. A ship-canal 1⅞ miles long has also been constructed around St. Mary's Falls at the outlet to Lake Superior, and opposite the one constructed by the United States. The Chambly canal and the St. Ours lock unite Lake Champlain and the St. Lawrence through the Richelieu River. The entire mileage of Canadian canals is 450.5, excluding the 28 miles of the abandoned improvement of Grand River.

Several short canals have been constructed for the purpose of overcoming rapids and falls in rivers, as the Louisville and Portland on the Ohio, the Muscle Shoals on the Tennessee, the Des Moines on the upper Mississippi and the one at the cascades of the Columbia. These are hardly canals in the old sense, but in conjunction with the improvement and canalization of rivers, they illustrate the tendency of modern waterway development, both in this country and abroad. The aggregate length of these special canals is small, and is no index of their importance, and each would call for separate mention in any complete discussion.

In the foregoing summaries, no canal is included that merely constitutes an artificial strait without locks, designed to shorten the passage between two navigable waters. A complete summary, so far as data are obtainable, of all the canals constructed in the United States and Canada, including canalized rivers and land-locked waters made part of canal systems, gives 6,548 miles. Of these 2,277.6 miles have been abandoned, while those in actual service aggregate 4,270.4 miles. Considered in the light of what now is actually being done, the abandonment of at least 1,000 miles was a mistake, and they are likely to be replaced by more adequate works in the future. The remainder probably had no sufficient reason for their construction.

The change in conditions brought about by modern railway facilities accounts for the decadence of the early type of canal and defines the line of future development. In the segregation of commerce between the two agencies, it is found that coarse freights of low value lying at the basis of industrial operations naturally seek the water routes, and also commodities to be moved in bulk over long distances, while the railway better satisfies the requirements of the detailed and distributive traffic and high-grade freight. Thus it is found on the Western rivers that the old-style steamboat is being replaced by barges moved in fleets over long distances. On the lakes, the average movement by water is from five to eight times that of the railways operating in the same territory. The reason is therefore clear why the old type of canal persists in mineral regions, and where forming part of long-distance water routes, and has fallen into disuse in other situations. Following further this line of reasoning, it is apparent that future development will be largely in the direction of uniting natural waters and the canalization of rivers, so as to form connected systems by which exchanges may be effected between remote sections, and that the capacity of these natural waters and their possibilities of development will determine the scale of the undertakings.

There are, however, certain limiting conditions, based on the unit cargo, which can be moved in competition with the railway. This was considered a generation ago by John G. Stevens and John B. Jervis, veteran authorities in such matters, and placed at 600 to 800 tons, or the maximum capacity of the best-equipped freight train. This limit to-day should not be placed at less than 1,000 tons of cargo, and a navigation suited to boats of this capacity over long routes may be relied upon to maintain its vitality in railway competition, and develop resources not otherwise practicable. Future canals will then be of the ship or barge canal type, suited to large vessels or to fleet movement.

The engineering resources of the waterway engineer have developed so radically in the last 20 years that the principles of location have materially changed. Larger prisms are demanded, not only for larger hulls, but for their free and rapid movement. These are best provided by canalizing the watercourses proper, by straight-

ening, deepening and widening where necessary, and by the use of dams that can be lowered in the flood seasons. Where the prism is not sufficiently scoured by the natural flow of the stream, it may be cheaply maintained by the hydraulic or other type of dredge. The canal proper is thus measurably limited to the summits between watercourses and to overcoming rapids and falls. It will be seen that the old location along the foot of the slopes of the valley, with embankments, aqueducts, waste-weirs and other artificial works, expensive to maintain and always subject to risk of failure and to interruptions of traffic, with complicated problems of seepage and feeders, is largely done away with.

The desirability of high lifts, in order to save time in lockage, and the increased capacity, still demands the fullest resources in providing feed-water at summits, but, happily, the important routes of the future lie over the deeper passes to which large areas may be made tributary; and, again, much consideration is being given to barge-lifts designed to overcome large elevations with a minimum use of water. These have proven very serviceable on the smaller type of canal, but it is doubtful whether the conditions will invite their use to the same extent on canals of large capacity.

In the way of ship-canals proper for maritime rather than domestic uses, the past twenty years has witnessed several notable achievements. The Suez canal has developed a commere of 8,000,000 tons, and is being gradually widened and deepened to better accommodate the traffic. The Corinth canal, across the Isthmus of Corinth, in the kingdom of Greece, was opened in 1893, substantially along the route upon which work was prosecuted in the reign of the emperor Nero, in A.D. 67. This canal is at sea-level and without locks, and is 3.91 miles long, 69 feet wide on the bottom, and 26 feet deep, and the excavation of 15,000,000 cubic yards of material was involved in its construction. It saves a long detour in the coasting trade and the tempestuous passage off Cape Matapan.

The North Sea canal, connecting the North Sea and the Baltic across the base of the Peninsula of Jutland, was opened with much ceremony in 1895. It is a sea-level canal, with tidal locks at either end, and is 61.3 miles in length. The width is 72 feet on the bottom and the depth 29.5 feet, and the material excavated was 104,640,000 cubic yards of earth. No special engineering difficulties were encountered. The formation of the prism through marshes, by placing two parallel embankments of sand and excavating between, was an interesting application of practice developed in Holland. This work was chiefly remarkable for its thorough and efficient organization and administration, and its steady prosecution to successful completion without unforeseen complications. Its inspiration lay in its military value to the German Empire, rather than in its commercial necessity, though it will doubtless develop large utility in the Baltic Sea trade.

The Amsterdam canal, uniting the port of Amsterdam with the North Sea, and 17.9 miles long, is undergoing enlargement to a bottom width of 82 feet and a depth of 27.9 feet, to be completed in 1896. There are tidal locks at the North Sea entrance and at the Zuider Zee end, and the founding of these works on a most difficult soil is of interest.

The Manchester ship-canal is a very ambitious attempt to make a seaport of the city of Manchester for that part of the seagoing business formerly transacted at Liverpool for Manchester and the surrounding district. The works have been carried out under much financial vicissitude and with some set-backs, due to failing contractors and unprecedented floods, and were opened in 1893. The canal extends from the estuary of the Mersey, at Eastham, a distance of 35½ miles, to the heart of Manchester, rising some 70 feet above mean sea-level by means of five locks, one of which is a tide-lock, at the entrance. It is generally 120 feet wide on the bottom and the depth is 26 feet, and the locks are 600 feet long and 65 feet wide. The excavation of nearly 7,000,000 cubic yards of rock, much of it of a friable character, and over 40,000,000 cubic yards of earth, was required. It is crossed by many bridges, mostly high level, with clear headway of 75 feet, so as to permit passage of vessels with top-masts struck. It contains a unique structure in the swinging aqueduct provided for the crossing of the Bridgewater canal. The great sluices devised for controlling floods are also of special interest. This canal, constructed in a densely settled country, with interests vested from time immemorial, presented many unusual problems. It is too early to judge the utility of this work. It certainly has given the Manchester district lower rates, and doubtless, with the adaptation of slowly changing institutions to the new conditions, it will eventually prove an important factor in the prosperity of the regions it is designed to serve.

In America the St. Mary's Falls canal, uniting Lake Superior with the other great lakes, has developed a commerce double that passing the Suez canal, and the largest lock in the world will be opened in 1897, its length being 800 feet, its width 100 feet, and with 21 feet of water on the miter-sills at the average lake-level. The Canadian government opened its new canal on the opposite shore in 1895, the lock being 900 feet long and 60 feet wide, with the same depth of water.

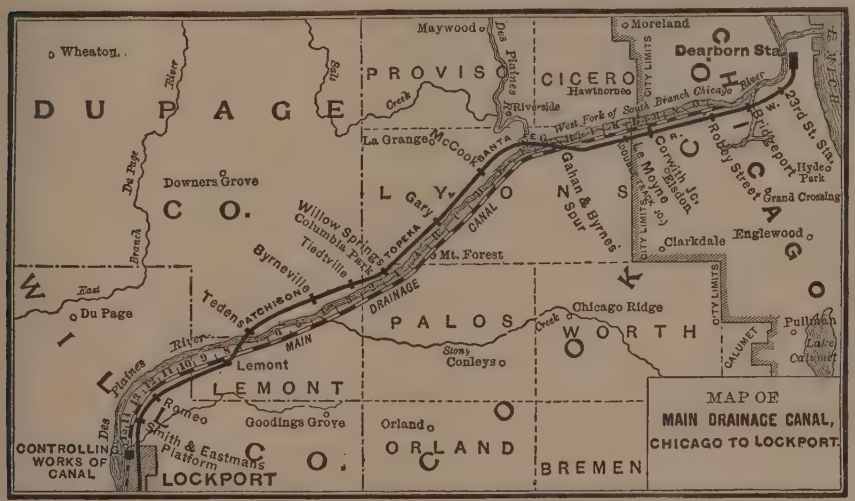
The most remarkable work of recent times, and now nearing completion, is the sanitary and ship canal of Chicago. The prism is larger than any canal heretofore constructed, and it is the only ship-canal so designed as to carry a large volume of water. Its primary purpose is to dispose of the sewage of the city, so diluted as to be without offense, and keep all polluted waters away from the lake front, and thus do away with the necessity of building costly water-works at some distant point on the north shore. Incidentally, the channel forms a much-needed deep-water extension of the

harbor; at the same time, it is the most costly part of a waterway to the Mississippi River, and carries the volume of water required in order to develop a 14-foot barge navigation through 300 miles of the Desplaines and Illinois rivers to the Mississippi. This work, in conjunction with the improvement of the Mississippi River now in progress, will enable this scale of navigation to be maintained between the lakes and the Gulf of Mexico for the larger part of each year.

The canal proper extends from a junction with the Chicago River, in the southwest part of the city, 28 miles to a point near Lockport, where it is to be discharged through controlling-works, designed to regulate the flow or stop the same at pleasure. Works will be required to conduct the waters through the city of Joliet for a distance of seven miles farther, and improvements of a radical character will be required between the head of the canal and Lake Michigan, through the city of Chicago. The entire extent of work is about 40 miles. The prism of the canal is 160 feet wide at bottom in solid rock and 162 feet at surface, while in earth-cutting the bottom width is 202 feet and 300 feet at the flow-line, the nominal depth throughout being 22 feet at low water, to be increased to 24 feet when finally completed to Lake Michigan. Seven miles of the Chicago end has been excavated, with a bottom width of 110 feet only, the purpose being to increase the prism to the standard by dredging after the canal is opened. The capacity is to be sufficient to pass ten thousand cubic feet of water per second at all times, and this is to be increased, under certain conditions, with the growth of population, the ratio of dilution to be maintained on the basis of 20,000 cubic feet per minute for each 100,000 of population.

The physical conditions which invited this work are in themselves remarkable. The old portage west of Chicago is scarcely ten feet above ordinary lake-level, and leads to the Desplaines valley, which in a distance of 30 miles from the lake has descended to its level, and in 10 miles more to some 75 feet below the same. The Desplaines River in flood overflowed the portage and divided its waters between the Mississippi and St. Lawrence basins. The canal problem was simply to cut a channel through the old pass which drained the lake region to the Mississippi in glacial times and restore in part the ancient outlet. In doing this, one half the distance is cut through solid Niagara limestone, and when this does not reach the surface, the sides of the cutting are carried up with massive retaining-walls so as to conform to the full rock-cut. In preparing for the construction of the canal proper, it was necessary to provide a new channel for the Desplaines River, draining 700 square miles, for a length of 13 miles and to define its course by massive embankments 20 miles long.

The work has developed the channeling-machine, by which the sides are chiseled out smooth in advance of the blasting, the cantilever-hoist for the rapid handling of rock in deep cuts, and the cableway-hoist for similar situations and for difficult glacial drift cuts. The steam-shovel has also received a notable development adapting it to heavy and rough work, machines of 60 to 80 tons being in use. The installation of the work represented a plant investment of about $3,000,000. An average force of 7,000 to 8,000 was employed during the favorable season and 6,000 tons of dynamite were used. Along the rock-cuts, the machinery was driven in large part from air-compressor stations on each section of about one mile. In the purely earth-cut toward the Chicago end, inclined and bridge conveyors were devised, with a large saving over former methods by cars, tracks and locomotives. The work was actually executed at prices of less than half what similar work in rock had been before estimated, and the earth-work has been greatly cheapened. The total excavation *in situ* was 12,200,000 cubic yards of rock and 37,500,000 cubic yards of earth, estimated at 67,000,000 yards in the waste-banks.

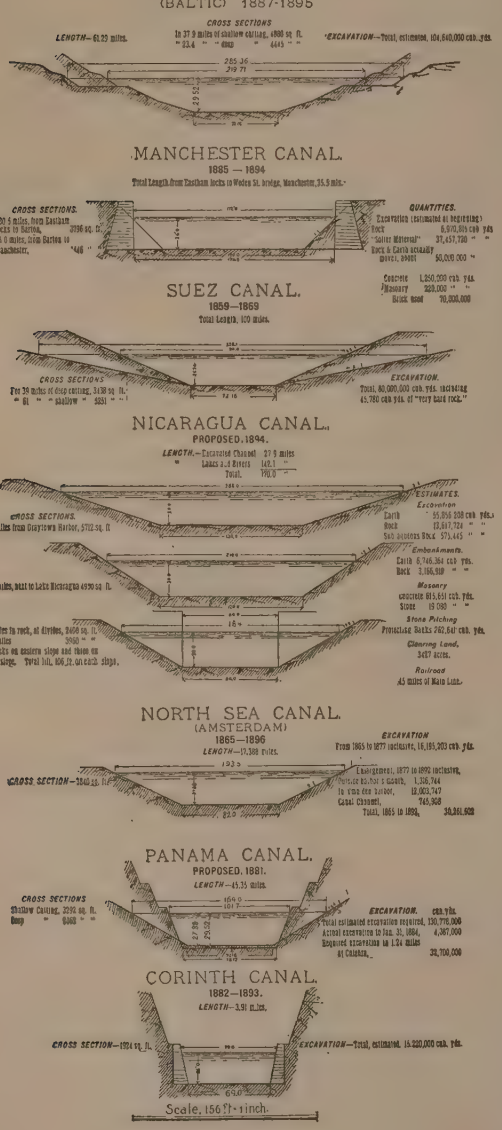


The work has been carried on by a board of nine trustees elected by the people, and this board is vested with all municipal powers necessary to its purpose by the sanitary district act passed by the general assembly of Illinois in 1889, and under which the sanitary district of Chicago has been organized. Work was actually begun in 1892, and prosecuted with great vigor, with the intention of completing the same in four years

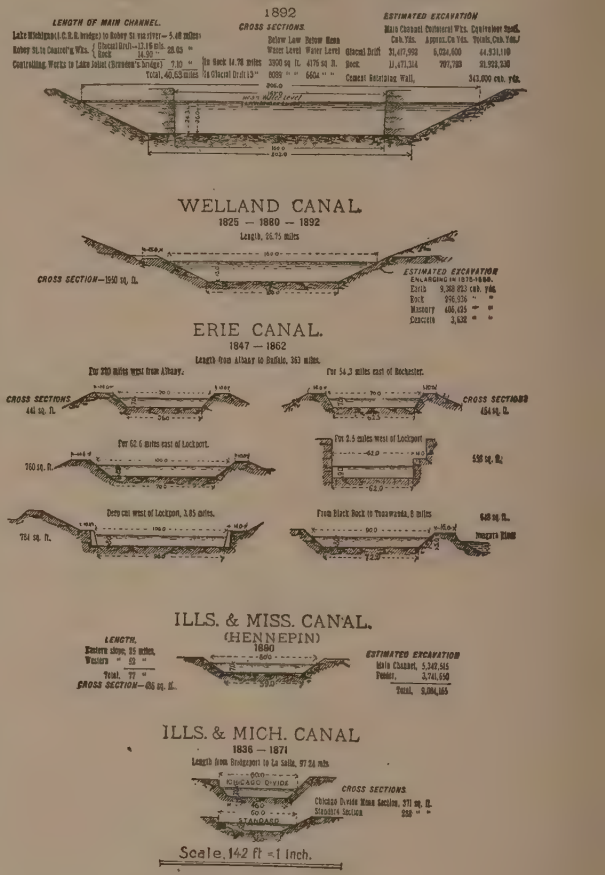
and opening the work in 1896. This could not be realized, as the financial management has been inadequate. However much final completion may be delayed, this work, measured by the material handled, will prove the cheapest of modern times; and in the development and use of appliances, in the volume of rock and in the engineering features it outranks any other yet constructed.

The project of cutting the American isthmus has received much attention within the 20 years, and an enormous sum of money was raised to construct a sea-level canal at Panama under the auspices of a company organized in France. The actual work performed was a mere fraction of the total, and out of all proportion to the expenditure, and the affairs of the company fell into the hands of liquidators, under very scandalous circumstances. Some efforts have been made to resuscitate the enterprise and complete the work, with a summit-level and locks, but confidence seems to be lacking, and this proposition has received little encouragement. The consensus of American opinion has favored the Nicaragua route, using Lake Nicaragua as a summit-level, as more practicable, and a company was organized, and expended some five million dollars in getting the work under way. Operations were suspended in 1893, owing to the financial depression, and several propositions have been brought before the Congress of the United States, designed to enlist the financial support of the government through a guaranty of bonds. Meantime the report of an engineering commission, appointed to examine the matter, has greatly increased the estimates and raised doubts as to the practicability of the project, so that some time may elapse before the

CROSS SECTIONS
— OF —
NOTED FOREIGN CANALS.



CROSS SECTIONS
— OF —
NOTED AMERICAN CANALS.



work is put in actual execution. The people of the United States are so fully persuaded of the political and commercial utility of the enterprise, that its postponement cannot be regarded as more than temporary.

The plate herewith is drawn to true proportions, and shows the relative cross-section of the notable ship-canals of the world as actually built or proposed.

One of the boldest and most far-reaching projects, now being considered by an international commission, is the proposition to extend navigation for seagoing vessels from the seaboard by both the St. Lawrence and Hudson rivers into the Great Lakes. This will involve several works of magnitude, and large problems in lockage. Considering the great marine development on the lakes and the enormous freight movement between the interior and seaboard, the consummation of this project will produce the greatest water route of the world.

Nothing is more certain than that, having measurably reached the limit of railway development and extended the service throughout the productive areas of the country, with densification and smaller margins of profit, the water routes will grow in importance, and the next great step in transportation facilities is probably in this direction. This development will not, however, be along the lines of early canal policies, but will define itself in connecting links through the great passes and valleys and in the improvement and canalization of natural waters. Eventually, the country will be netted with an arterial system to which other means of transportation will furnish the veins and capillaries.

LYMAN E. COOLEY.

CANAL DOVER, a village of Tuscarawas County, central eastern Ohio, on the Tuscarawas River, about a hundred miles N. of Marietta, on the Ohio canal, on the Cleveland, Lorain and Wheeling, the Cleveland and Marietta and the Cleveland and Pittsburg railroads. Here are a rolling-mill, iron-furnace, tannery, boiler factory and flour-mills. Population 1890, 3,470.

CANANDAIGUA, village and lake of Ontario County, New York. (See Vol. IV, p. 795.) The village is on the Northern Central and the New York Central and Hudson River railroads. There are here two academies, a private insane asylum, two orphan asylums, a brewery and several factories. Population 1890, 5,868.

CANARIS, CONSTANTINE. See KANARIS, in these Supplements.

CANARIUM, a genus of Asiatic trees belonging to the family *Burseraceæ*, a family noted for its strong aromatic resins and balsams. The genus *Canarium* is one of the largest, and abounds in aromatic resins, some of its species being supposed to be among those yielding "gum elemi."

CANARY-GRASS, a popular name applied to *Phalaris Canariensis*, a grass yielding "canary-seed." It is a native of the Canary Islands, is extensively cultivated in Europe, and has also become somewhat naturalized in the United States. *P. arundinacea* is the common "reed canary-grass" of bogs and low grounds, a striped variety of which is cultivated for ornament under the name "ribbon-grass."

CANASTOTA, a village of Madison County, central New York; about 30 miles W. of Utica, on the West Shore, the New York, New Haven and Hartford and the Delaware and Hudson railroads. It is the seat of an academy, and contains manufactories of cutlery, astronomical instruments; has saltworks, canning factories, etc. Sulphur and iron springs are also found here. Population 1890, 2,774.

CANAVERAL, CAPE OF, on the east coast of Florida, 135 miles S.E. of St. Augustine, in lat. 28° 27′ N., long. 80° 33′ W.; just east of Merritt's Island and separated from it by a branch of the Indian River. The government light located here is a revolving one.

CANBY, EDWARD RICHARD SPRIGG, soldier; born in Kentucky in 1817; killed in Siskiyou County, California, April 11, 1873. He graduated in 1839 from West Point; served with distinction in the Mexican War, as well as in the war of the Union, receiving the full rank of brigadier-general in 1866. He was in command of the United States troops at New York in 1863, during the draft riots. He captured Mobile in 1865, and received the surrender of the armies under Gen. R. Taylor and Gen. E. K. Smith. During the winter of 1872–73 he was engaged in making terms with the Modocs, and was treacherously shot by "Captain Jack" while conferring with them regarding a treaty of peace.

GENERAL CANBY.

CANBY, FORT, a United States army post and fortification on Cape Disappointment, Washington, at the mouth of the Columbia River, 14 miles from Astoria. It is the principal defense for the entrance of the river.

CANCELLARIA, a genus of gasteropod molusks, characterized by the shell being marked off into squares by transverse ribs and revolving lines. They are found in northern seas.

CANCER, a genus of brachyurous crustaceans which includes the common shore-crabs.

CANCER-ROOT, a name applied to species of *Epiphegus*, *Conopholis* and *Aphyllon*, of the family *Orobanchaceæ*, and often extended to the whole family. The family is made up of root-parasites, destitute of green foliage, with yellowish or brownish scales in place of leaves. *Epiphegus* is also known as "beech-drops"; *Conopholis* as "squaw-root"; and many other species as "broom-rapes."

CANCRINITE, a silicate of alumina and soda found in Norway and in Maine. It is a variety of nephelin. See MINERALOGY, Vol. XVI, p. 412.

CANDLENUT TREE (*Aleurites*), a native of

Java, Hawaii and other Pacific islands. It is so named from the natives stringing together the nuts, which are very oily, and thus making candles. See also OILS, Vol. XVII, p. 745.

CANDYTUFT. See *Iberis*, under HORTICULTURE, Vol. XII, p. 251.

CANELLA, a small genus of tropical American trees of the family *Canellaceæ*. The best-known species is *C. alba* of south Florida and the West Indies, the "wild cinnamon" or "white cinnamon," under which latter name the fragrant bark is exported.

CAÑETE, MANUEL, Spanish poet; born in Seville, Aug. 6, 1822; after a short term of study at Cadiz, he entered the government service in the office of the Minister of the Interior. He has written several volumes of poetry and also a number of dramas. He has made a special study of Spanish dramatists of the fifteenth and sixteenth centuries. He has published the result of his study in *Spanish and Spanish-American Writers* and *The Spanish Stage of the Sixteenth Century*.

CANFIELD, JAMES HULME, president of the Ohio State University since 1895; born at Delaware, Ohio, March 18, 1847; studied at the Polytechnic Institute of Brooklyn, and graduated from Williams College; practiced law at Jackson, Michigan, and at St. Joseph, Michigan; superintendent of schools at the latter place in 1876; in 1877 to 1891, professor of history and political science in the University of Kansas; was president and secretary of the National Educational Association; elected chancellor of the University of Nebraska in 1891.

CANICULAR YEAR, also SOTHIC or SOTHIAC YEAR, a fixed year of the ancient Egyptians. See EGYPT, Vol. VII, p. 729.

CANISIUS, PETER, Jesuit missionary; born in Nimeguen, Netherlands, May 8, 1521; died in Freiburg, Switzerland, Dec. 21, 1597. His name was properly the Dutch De Hondt (dog) which he turned into the Latin Canisius; the first man to become a Jesuit in Germany; became the leader of the order there and in Austria; preacher to Ferdinand I; a member of the Council of Trent, 1545; vice-chancellor of the University of Ingolstadt, 1549; wrote *Institutiones Christianæ Pietatis* and *Summa Doctrinæ Christianæ*. Beatified in 1864 by Pius IX.

CANKER-WORM, the larval form of two species of moths of the genus *Anisopteryx*, belonging to the family of measuring-worms, *Geometridæ*. The worms are ash-colored above, black on sides and yellowish beneath. The wingless female moth ascends orchard trees, such as apple, cherry, plum, and deposits her eggs. The larvæ are very destructive to the foliage in their early life. Later they descend the tree and burrow in the soil, where the metamorphosis takes place. The canker-worms are common in America from Maine to Texas.

CAN-MANUFACTURE AND CANNERS' TOOLS. Tin cans are made mostly for the canning of fruits, meats and vegetables, condensed milk, spices, paints and varnishes, etc. There are in the United States eight or ten large establishments making cans and supplying them to the canning factories. Some of these factories have an output of over 100,000 cans per day each. Many of the canning factories are making their own cans, of late years, especially in the districts where they are located away from the railroad centers. Fruits and vegetables are usually packed in round cans, the small sizes being known as 1, 2 and 3 pound cans, and the larger sizes as half-gallon and gallon. Meats are usually packed in tapering oblong cans, ordinary fish in oval cans, and sardines in a small oblong can, in imitation of those first put up in France and Italy.

In the large factories automatic machinery is used for cutting out the parts and soldering together the cans. In the smaller factories the work is done mostly by hand. A press run by foot-power is used to stamp the tops and bottoms, and a boy or man will produce about 1,000 per day. The bodies are cut in square shears, and are then formed up in forming-rolls. The bodies are then placed on special formers and the side seams soldered. After the tops and bottoms are placed on the body it is rotated in a bath of melted solder, which connects the three parts and leaves the can air-tight. After the cans are filled with the contents, the caps are soldered on by hand. Square, oblong and oval cans are made in the same manner, the only variations being in the shape of the dies and frames and the method of soldering. Ordinary country factories usually put up from 300,000 to 1,000,000 cans during a season's pack.

The Ferracute Machine Company's foot-presses for can-makers are made with an adjustable frame which permits the stamping to be done upright, or at any suitable angle rendered convenient by the nature of the work, which is usually slid off the die through the hole in the back of the press into a box. Sets of dies are furnished with the presses for a variety of work.

The Page vacuum can-testing machine has a horizontal rotating wheel, on which the cans are mounted as hollow arms. As the wheel goes around, the cans are put in place by a boy, and if imperfect, so that they leak, and no vacuum can be formed, they fall off automatically, and are thus separated from the perfect cans.

The Ferracute soldering turn-table has a heavy iron pedestal, around which is a rotating table with eight treadles and seaming-frames. The can bodies are set on the table, the seams soldered, and the cans removed by different operatives as the table turns around. On top of the pedestal is a fire-pot with soldering-coppers. Double seaming-machines are made for forming a tight seam without solder, and these do very well for goods that are not "processed." Other machines used by the can-maker are capping-machines, for soldering a number of cans at once; floating-machines, for soldering the end seams on the outside; can-beaders, for forming the mouths of the bodies of open-top cans; folding-machines, for square and oblong cans; crimpers, for crimp-

ing the bottoms of cans and small pails; can-heading machines, and various grooving, notching, flanging, squeezing, threading, cleaning and polishing machines, together with can-wedges, floating-boards, soldering-plates, solder-ladles and solder-kettles, etc. A great variety of dies of almost numberless shapes and designs are also used. C. H. COCHRANE.

CANNA, a tropical American monocotyledonous genus of about 30 species, largely cultivated for ornament, and belonging to the family *Scitaminaceæ*, although sometimes restricted to a family by themselves, the *Cannaceæ*. The common name "Indian shot" refers to the hard shot-like seeds in the rough three-celled pod. The flowers are irregular and showy, and the leaves large and handsome.

CANNABIS, the generic name of the plant yielding "hemp," the only species being *C. Sativa*. It is a native of India, but is extensively cultivated in almost all countries for its fiber. It also yields the "hashish" of the Arabians, and the "bhang" of the Hindus. See HEMP, Vol. XI, p. 647.

CANNING, SIR SAMUEL, civil engineer; born in Wiltshire, England, in 1823; manufacturer and superintendent of the laying of the Atlantic cables of 1865, 1866 and 1869, and the Mediterranean cables; also, was largely in charge of the English cables to Gibraltar, Malta and Alexandria. By his direction the Atlantic cable, lost in 1858, was found and relaid. He was knighted in 1866.

CANISTEO, a village of Steuben County, western New York, situated on the Canisteo River, 55 miles W. of Elmira, on the New York, Lake Erie and Western railroad. It contains manufactories of flour, leather, chairs, lumber, and boots and shoes. An academy is here. Population 1890, 2,071.

CANNELTON, a city, capital of Perry County, southern Indiana, on the Ohio River, 70 miles above Evansville, on the Louisville, Evansville and St. Louis railroad. It is an important coaling-station for steamboats, and manufactures cotton goods, flour, pottery, chairs, paper, lumber and drain-tiles. Population 1890, 1,991.

CANNING INDUSTRY. There are now more than twenty thousand canning factories in the United States and territories. Maryland has the largest number, followed, in order, by Maine, New York, Virginia, New Jersey, Delaware and California. Employment is given by these factories during the canning season to more than one million persons, while some three million more have indirect connection with the business, through raising the fruit, vegetables, etc., for their use, manufacturing machinery, or selling the product. It is estimated that one and a half million acres of land in the United States are devoted to raising goods for the canners. Three thousand fishing-vessels and twenty-five thousand fishermen find employment in gathering salmon, mackerel and other fish for canning, while two thousand vessels and twenty thousand men in the oyster industry are kept busy supplying the canner. The number who furnish meat to the canning-house is not obtainable, but the output of canned meats foots up to twenty-five million dollars annually.

The machinery used in a canning factory includes usually the following: A steam-boiler for heating a water-bath, with piping and connections to tanks or kettles; scalding kettles or tanks are used for scalding or blanching numerous vegetables; exhaust tanks or kettles are required to exhaust cold air from the cans after they have been packed and capped; process kettles or tanks are provided for cooling or "processing" the canned fruit; scalding-baskets of heavy galvanized wire are used for tomatoes, in order to facilitate peeling; crates made of strap-iron, with handles which may be hooked to a crane, are used for handling cans in quantities, in the operations of exhausting and "processing." Many factories use gasolene fire-pots for heating capping-steels and tinning-coppers; gasolene-tanks have to be provided for these, and an air-pump for pumping air into the gasolene-tank, thus forcing the oil to the fire-pots, where it is vaporized and burned as a gas. The tinning-coppers are used to close the vents after the air has been exhausted from the cans. Capping-tables are used for holding fire-pots and for capping cans. Can-tongs, platform-scales, thermometers, syrup-gauges, and various minor tools complete the outfit. For special work there are made pea-hulling machines that will handle one thousand bushels a day; rotary pea-separators, that will grade into sizes six hundred bushels a day; corn-cutting machines, taking the corn from the cob at the rate of seventy ears a minute; corn-silking machines, for removing silk and refuse from the corn after it is cut from the cob; automatic steam-cooking and can-filling machines for corn, having a capacity of twelve thousand cans per day; can-dipping machines, for filling cans or jars with liquids of various kinds; tomato and pumpkin fillers, for accurately filling cans; pumpkin-peelers; pumpkin-graters; pea-sieves, for grading peas in small quantities; pea-blanchers, for scalding and blanching hulled peas; corn-cutting knives, and various forms of parers, graters, seeders, corers, etc.

Wages paid in canning factories vary from $2.50 to $1 a day, or less, a considerable portion of the work often being done by women or children working by the piece. C. H. COCHRANE.

CANNON-BALL TREE, a name applied to *Couroupita Guianensis*, a large tree belonging to the *Myrtaceæ*. It is a native of Guiana, as its specific name implies, and has received its common name from the hard globular fruit, which resembles a large cannon-ball.

CANOE, MODERN PLEASURING. The sport of sailing and racing canoes had its origin in New York City in 1871, and the formation of clubs and annual regattas since that time has resulted in a material development of this form of water craft. The early canoes carried lateen, leg-of-mutton and four-sided fore-and-aft sails, being universally two-masted. Experience showed that an extension of the lower portion of the sails was desirable, so ar-

ranged that it could be reefed in at times. In 1883 the *Atlantis* was built, with sails having equilateral triangular tops, and being rectangular below. In 1885 the form was altered so as to bring the peak to the top of the mast. More recent forms have four or five divisions, like the parts of a folding fan. These can be reefed in as desired. Others maintain the triangular peak, with a rectangular body, arranged for two or three reefs. It was not until about 1888 that the canoeists learned that it was best to get out of the hold and sit on the deck to balance the sails. In 1888 there was introduced a sliding deck-seat, on which the sailor would extend his body as ballast. The canoes have also been improved by the addition of center-boards, the prevailing type being made of several fan-like leaves. Canoes managed only with a double-bladed paddle also have been used in races, but they are not as popular as the sailing-canoes. C. H. COCHRANE.

CANNON, JOSEPH G., born in Guilford, North Carolina, May 7, 1836; removed to Illinois and practiced law; was state's attorney, March, 1861, to December, 1868. In 1874 he was elected to Congress as a Republican from the fifteenth district of Illinois and re-elected continuously until 1890, and again in 1892 and 1894.

CANON, in music. See MUSIC, Vol. XVII, p. 82.

CAÑON CITY, the capital of Fremont County, central Colorado, 41 miles from Pueblo by the Denver and Rio Grande railroad and the Atchison, Topeka and Santa Fé railroad. It is on the Arkansas River, just below the Grand Cañon. It is popular as a health-resort, owing to its mild climate, mineral springs and the beautiful scenery of the vicinity. The surrounding country abounds in copper, silver, coal, iron, marble, limestone and oil. Population 1890, 2,825.

CANONSBURG, a borough of Washington County, southwestern Pennsylvania, on the Washington branch of the Pittsburg, Cincinnati, Chicago and St. Louis railroad, 22 miles S.W. of Pittsburg. In 1802 Jefferson College was founded at this place, the first college west of the Alleghanies. It was removed to Washington, Pennsylvania, in 1869, and united with Washington College there. Canonsburg is the site of the Western Pennsylvania State School of Reform. It has iron, steel and coal works, rolling and planing mills. Population 1893, 2,800.

CANONESS, the title given to a class of women, the members of a Roman Catholic order during the eighth century and for some time afterward. The rules governing the order were not so severe nor so rigid as those governing nuns. They took the vows of celibacy, to last only during membership. They were not required to live in poverty nor in cloisters. They were divided into secular and regular, a division brought about in the natural order of growth, and not indicated by law. To the secular belonged many of the daughters of princes and nobles. The chief occupation of the canoness was the education of girls, transcription of church books and embroidery of vestments. The order was confined to the German Empire.

CANONICUS, chief of the Narragansett Indians at the time of the landing of the Pilgrim Fathers at Plymouth in 1620; died June 4, 1647. He gave to the colonists of Roger Williams the land upon which stands the city of Providence. It was this chief who sent to Governor Bradford a rattlesnake-skin stuffed with arrows as an indication of hostility, and to whom the governor returned the skin stuffed with powder and bullets.

CANOPIC VASES. See POTTERY, Vol. XIX, pp. 603, 604.

CANOPUS, a star of the southern hemisphere, constellation Argo Navis, or the Ship Argo. It is situated in the rudder of the ship, and is said to have received its name from Canopus, the pilot of Menelaus. It is the brightest star of the constellation.

CANOPY. See ARCHITECTURE, Vol. II, p. 461.

CANOSSA, a small town of Italy, in Emilia, 11 miles S.W. of Reggio. Its chief interest lies in the fact that here Henry IV, emperor of Germany, made humiliating submissions to Pope Gregory VII, in 1077. See HENRY IV, Vol. XI, p. 668.

CANOVAS DEL CASTILLO, ANTONIO, Spanish statesman; born Feb. 8, 1828, at Malaga, Spain; assassinated at Santa Agueda, Aug. 8, 1897. He became a journalist in 1852, and the same year began to take an active interest in politics. He was elected to the Cortes, or Chamber of Deputies, in 1854. He was an active royalist, and took a prominent part in the restoration of Alphonso XII in 1874, and was, in that year, appointed Prime Minister. He remained in office until 1879, being forced to resign by the opposition of Martinez de Campos. He was again called to the premiership in 1880, and from that time on alternated in the office with Sagasta. He was a Conservative, and under his leadership that wing of the government constantly increased in power. In addition to his political work, Señor Castillo found time for historical writing. Among his published works are *History of the Decline of Spain from the Ascension of Philippe III to the Death of Charles II; Problems of To-day;* and *Arts and Letters.*

CANROBERT, FRANÇOIS CERTAIN, marshal of France; born at St. Céré, Lot department, June 27, 1809; died in Paris, Jan. 28, 1895. He entered the Military School of St. Cyr in 1826, and later enlisted as a private soldier. He served many years in Africa, and was wounded in the siege of Constantine. In the Crimean War he commanded a division and was wounded at Alma. Promoted commander-in-chief, he headed a charge of zouaves at Inkerman, and was again wounded. He commanded the Third Corps at Magenta and Solferino, and was made marshal of France, and awarded the grand cross of the Legion of Honor. In the Franco-Prussian war his corps was cut to pieces by the Crown Prince of Prussia at Wörth, Aug. 6, 1870. He was shut up in Metz with Bazaine, and after the surrender was sent a prisoner to Germany. In 1876 he was elected to the Senate, and again in 1879 and 1885. He retired at the expiration of the last term, and did not again appear in public except at the funeral of Marshal McMahon in 1893.

CANSO, the name of a strait, cape, and town of Nova Scotia. The strait runs from St. George's to

Chedabucto Bay, connecting the Gulf of St. Lawrence with the Atlantic Ocean and separating Cape Breton Island from Nova Scotia. It is 17 miles in length and varies between 2 and 3 miles in width. The cape, on St. Andrew's Island, is the extreme eastern point of Nova Scotia. The town is a seaport in Guysborough County, on the Chedabucto Bay, 35 miles E. by S. of Guysborough. Population 1891, 1,824.

CANSO, GULF OF. See CAPE BRETON, Vol. V, p. 40.

CANTABRI, an ancient people. See CANTABRIA, Vol. V, p. 27.

CANTABRIAN MOUNTAINS. See SPAIN, Vol. XXII, p. 294.

CANTALOUPE. See MELON, Vol. XV, p. 841.

CANTATA. See MUSIC, Vol. XVII, p. 88.

CANTEEN, a term derived from the Italian *cantino*, meaning a wine-cellar. It is applied (1) to a sutler's store connected with a camp or garrison, in which spirituous beverages are sold under military regulation; (2) to a mess-case used by British army officers to hold knives, forks, tea and like articles for use at the mess-table; (3) to a soldier's flask or vessel for carrying water or other portable liquid on the march, usually strung about the neck when worn. Its usual capacity is about three pints. The regulation canteen of the United States army is made of two concave tin plates joined together and having an open neck, and covered with some woven fabric.

CANTERBURY-BELL, a species of the campanula. See HAREBELL, Vol. XI, p. 478.

CANTILEVER, a bracket used in architecture for supporting cornices and balconies The term, originally thus applied, is better known as the name of a class of bridges in which two brackets are built out, one from each bank of the stream to be bridged, to meet at the center without the support of intermediate piers.

CANTO FERMO, the simple melody of the ancient chants of cathedral music. These tunes form the basis of the compositions of many of the Roman Church composers. See PALESTRINA, Vol. XVIII, pp. 179, 180.

CANTON, a city of Fulton County, west-central Illinois. It is situated on the Chicago, Burlington and Western, the Illinois Western and the Toledo, Peoria and Western railroads. By the last of these it is 28 miles W.S.W. of Peoria. It commands abundant supplies of grain, timber, clay and coal, and has numerous manufactories, comprising cigar, tile, gun, broom and cigar-box factories, marble-works and flouring-mills. It has gas and electric-light works, a public library and a high school. Population 1890, 5,604.

CANTON, a town of Norfolk County, eastern Massachusetts, situated on the Neponset River, and on the New York, New Haven and Hartford railroad, 14 miles S. of Boston. Within the township are extensive manufactories of machinery, sewing-silk and cotton and woolen goods. Population 1890, 4,538.

CANTON, the capital of Madison County, central Mississippi. It is situated on the Illinois Central railroad, 24 miles N.N.W. of Jackson. It has 8 churches, 5 schools, planing-mills, box and agricultural tool factories. Population in 1890, 2,131.

CANTON, a town of Lewis County, northeastern Missouri, an important shipping-station for the surrounding country, being conveniently situated on the St. Louis, Keokuk and Northwestern railroad, 142 miles N.N.W. of St. Louis, on the Mississippi River. Christian University is here located. Population 1890, 2,241.

CANTON, a manufacturing town, county seat of St. Lawrence County, northeastern New York, situated on Grass River and on the Rome, Watertown and Ogdensburg railroad, 50 miles N.E. of Watertown. Canton Academy and the St. Lawrence University (Universalist) are two of the institutions here located. It has also a boat factory of importance. Population 1890, 2,580.

CANTON, a city and capital of Stark County, northeastern Ohio. It is situated on half a dozen railroads; by the Cleveland, Canton and Southern railroad it is 60 miles S.E. of Cleveland. It is an extensive manufacturing city, its industries numbering over 450, in which are invested twelve millions of dollars, and which employ 5,000 hands. The chief of these industries is the manufacture of agricultural implements, bricks and tiles, products of lumber, roofing materials, and saddlery and harness and railway car shops. It is also important as an agricultural shipping-station, receiving from the vicinity corn, wheat and oats in abundance. The residence of Major William McKinley, Jr., is at Canton. Population in 1890, 26,327, an increase of 14,069 since 1880. See also CANTON, Vol. V, p. 39.

CANTON, a borough in Bradford County, northeastern Pennsylvania, located on the Northern Central railroad, 38 miles S. of Elmira, and having in 1890 a population of 1,393; that of the township being 1,835.

CANTON, town and county seat of Lincoln County, southeastern South Dakota, situated on the Sioux River, about 70 miles N. of Sioux City. It is on the Chicago, Milwaukee and St. Paul railroad. It is the seat of Augustana College; has several manufactories, water-works, good schools and an electric-light plant. Population 1895, 1,611.

CANTON, in geography, a division of territory constituting a separate government or state, as in Switzerland. In France a canton is a subdivision of an arrondissement, comprising several communes. In heraldry it is used to designate a small division in the corner of a shield, generally the dexter corner. When it is on the left side it is called a *canton sinister*.

CANTONMENT, in general use applied to quarters for soldiers. Troops, when not in close proximity to the enemy and yet in the field, are distributed among adjacent villages and quartered upon the inhabitants. These villages are then called cantonments. In India, cantonments have become permanent military towns, containing barracks for troops, houses and gardens for the officers, magazines, public buildings, etc. Such towns are distinct from the native villages and cities.

CANTU, CESARE, an Italian author; born at Brivio, in December, 1807; died March 11, 1895. He was educated at Sondrio, where, at the age of 17, he was appointed professor of *belles-lettres*. Having been imprisoned in 1833 for the offense of expressing liberal tendencies in a historical work on Lombardy, he spent his leisure hours in describing the sorrows of a prisoner in the form of a historical romance, *Margherita Pusterla*. His great work, *Storia Universale* (35 vols., 1836–43), was followed by many others on history and literature, as well as by some of lighter vein.

CANTYRE, in Scotland. See KINTYRE, in these Supplements.

CANVAS-BACK DUCK. See POCHARD, Vol. XIX, p. 252.

CAONABÓ, a Haitian chief, or cacique, a Carib by birth. He was cacique of the southern part of Haiti, in the Maquana district. The colony left at Fort Navidad by Columbus was massacred by Caonabó in 1493. He organized the Indians against the Spaniards in 1494, and was defeated at Vega Real by Columbus. He was taken prisoner through treachery in 1496, but died on the voyage to Spain.

CAOUTCHOUC. See INDIA RUBBER, Vol. XII, p. 835.

CAPACITY, as a legal term, is the power or legal right or qualification to perform civil acts, which power or qualification depends upon the state or condition of the person with reference to certain restrictions or requirements fixed by law. Thus a person under the age of 21 years has not the capacity to vote at an election, since the law imposes the restriction that only those of the age of 21 years or over may have such right. Until recently the law has not given the capacity of exercising the electoral franchise to women, and they are still, in most states, given this capacity only to a limited extent. Persons under 21 years of age have not the legal capacity to bind themselves by contract, and a child under the age of 7 years has not the capacity to commit crime, or usually under the age of 12, unless it be affirmatively shown that the child knew the nature of the act. An insane person has not the legal capacity to commit a crime or to bind himself by contract. Civil incapacity or disability is often imposed upon criminals as a punishment, especially to the extent of disfranchisement. Foreigners have not the legal capacity to exercise many of the civil rights and privileges. They have not the capacity to exercise any political rights, and in many states they cannot own real estate. Formerly, married women were debarred from exercising many of the civil rights of a citizen, but by statute many of their common-law disabilities have been removed in most states, especially as to property rights.

CAPAC YUPANQUI. See CHILI, Vol. V, p. 618.

CAPE BRETON. See NOVA SCOTIA, in these Supplements.

CAPE COLONY. For general description, see CAPE COLONY, Vol. V, pp. 41 et seq. Cape Colony is divided into 74 divisions and its dependencies into 29 districts. These dependencies are East Griqualand, Tembuland, Transkei and Walfish Bay. In 1891 Cape Colony proper, including West Griqualand, had an area of 206,613 square miles, and with its dependencies, 221,311 square miles. In 1891 the population of the whole was 1,527,224. Pondoland was annexed in 1894 and British Bechuanaland in 1895. These two territories added 60,770 square miles to the area and 60,376 to the number of inhabitants. Of the inhabitants in 1891, 1,150,224 were natives and colored persons. The same year the population of the chief towns was as follows: Cape Town, the capital, 51,251; Kimberley, 28,718; Port Elizabeth, 23,266; Graham's Town, 10,498; and Beaconsfield, 10,478. Aided government immigration was stopped in 1886. In 1894 the arrivals were 18,133, and departures 10,288. The number of registered voters in 1895 was 91,875. The legislative power rests in a council of 22 (1896) members, elected for seven years, and a House of Assembly consisting of 76 (1896) members, elected for five years. The government in its executive department consists of the Governor and the Ministry, which is made up of the Prime Minister and Treasurer, Colonial Secretary, Attorney-General, Commissioner of Public Works and Secretary of Agriculture. In 1891 there were in the colony 732,047 Protestants, 17,275 Catholics, 3,009 Jews, 15,099 Mohammedans and 753,824 "no religion." In 1894 there were 1,933 colleges and schools, including the university. The government expended on education, in 1894, $880,950. There were, that year, 52 public libraries, aggregating 295,394 volumes. In 1894 the total income of the colony was $28,106,760 and the expenditure $29,117,240, which includes a military expenditure of $620,570. The imports in 1894 were valued at $57,940,480 and the exports at $67,515,220. Large amounts of wheat, oats, barley, corn and tobacco were raised. Of wine, 4,559,904 gallons were made, and 1,384,480 gallons of brandy. Wool, mohair, ostrich feathers, cheese and butter were exported. Sheep-raising occupied 83,900,000 acres of land. The factories, tanneries, gold, silver and diamond mines employed 32,735 persons. There are in the colony over 8,000 miles of road. There were, in 1894, 2,443 miles of railroad. Telegraph lines extending over 800 miles have been constructed by the government. See also AFRICA, in these Supplements.

CAPE ELIZABETH, town and summer resort, in Cumberland County, southwestern Maine, on the Boston and Maine railroad, and a suburb of Portland. It has a state reform school, important manufactories, a dry-dock, an oil-refinery and a rolling-mill. There are two lighthouses on the cape, on which the town is situated, one with a revolving and one with a stationary light. They are 140 feet above the sea. In 1890 the population was 5,459.

CAPE FEAR RIVER, a river formed by the junction of the Haw and Deep rivers at Haywood, Chatham County, central North Carolina. It flows southeast for a distance of 175 miles, past Fayetteville, Elizabethtown and Wilmington; flows into the Atlantic at Cape Fear, the southernmost point of the state. The river is navigable for 120 miles, as far as Fayetteville.

CAPE FRANÇAIS. Same as CAPE HAYTIEN, Vol. V, p. 50.

CAPE GIRARDEAU, a city of Girardeau County, southeastern Missouri, on the Mississippi River, 130 miles below St. Louis. The St. Louis, Cape Girardeau and Ft. Smith railroad runs through the city. It has a normal school, a female academy and St. Vincent's College. It exports cotton, and its manufactures are plows and mineral paints. Population 1890, 4,297.

CAPEL, THOMAS JOHN, MONSIGNOR, an English Roman Catholic prelate; born at Brompton, Oct. 28, 1836; was ordained a priest in 1860; founded St. Mary's Normal College at Hammersmith in 1854; established the English Catholic mission at Pau; was private chamberlain to Pope Pius IX in 1868; established the Roman Catholic public school at Kensington in 1873; visited America in 1883. He has held many important church offices, and gained a reputation as a preacher. He has published several volumes, among them *Great Britain and Rome; The Holy Catholic Church;* and *The Pope the Head of the Christian Church.*

CAPELIN OR CAPLIN (*Mallotus villosus*), a small fish of the smelt family, found in northern seas. It forms a large portion of the cod's food, and the fishermen use it as bait. It is used as food in Europe.

CAPELLA, a bright star of the first magnitude, on the left shoulder of the northern constellation of Auriga, in front of the Great Bear, nearly in a line with the two pointers.

CAPE MAY, a city and watering place at the southern extremity of New Jersey, 81 miles by rail from Philadelphia, and in a county of the same name. Adjoining it on the west is Cape May Point, at the mouth of Delaware Bay, and here is a revolving lighthouse 150 feet high. Inland there are lagoons used for sailing and fishing. About 12,000 people make these places a summer resort, and at Cape May there are several large and fashionable hotels. Steamboat excursions from Philadelphia to the Point are made daily in the summer, whence visitors may go by a trolley road to Cape May. The beach is unbroken and the bathing good. Permanent population of Cape May in 1895, 2,452.

CAPE MAY COURTHOUSE, town in Middle township, Cape May County, southern New Jersey, and capital of the county. It is situated on the West Jersey railroad and the South Jersey railroad, 12 miles from Cape May City, and midway between the Atlantic Ocean and Delaware Bay. The population of the township in 1895 was 2,500.

CAPEN, ELMER HEWITT, president of Tufts College, Massachusetts, and a leader of the Universalists; born in Stoughton, Massachusetts, April 5, 1838; in 1860 was graduated at Tufts College; elected to the legislature while in college; began the practice of law in 1863; entered the ministry in 1865; preached at Gloucester, Massachusetts; St. Paul, Minnesota; and Providence, Rhode Island; was appointed president of Tufts College in 1875. He published, in 1878, *The Latest Word of Universalism*, and wrote the article on Universalists for this ENCYCLOPÆDIA.

CAPERCAILZIE, a bird. Same as CAPERCALLY. Vol. V, pp. 53, 54.

CAPERS, WILLIAM, a bishop of the Methodist Episcopal Church South; born in St. Thomas Parish, South Carolina, Jan. 26, 1790; died in Anderson, South Carolina, Jan. 29, 1855; studied at South Carolina College; began the study of law, but was licensed to preach in 1808; was minister to the Creek Indians in Georgia in 1821; in 1825, became editor of the *Wesleyan Journal*, which was merged into the *Christian Advocate* of New York in 1826; was editor of the *Southern Christian Advocate* in 1837; became bishop in 1846. He wrote an autobiography, *Short Sermons for Children*, and *Catechisms for Negro Missions.*

CAPE VINCENT, a village and summer resort of Jefferson County, New York, situated on the St. Lawrence River, opposite Kingston, Ontario, at the outlet of Lake Ontario. Shingles and flour are here manufactured, and there are also large seed warehouses. The place is a port of entry. It is a popular resort for tourists, as the vicinity furnishes good fishing. Population in 1890, 1,324.

CAPIAS. A *capias* is a writ issued out of a court, directing the sheriff to take the person therein named in custody. It is in the nature of a supplemental writ, and is issued only to enforce compliance with a prior original writ, or a judgment or decree of the court. Many kinds of *capias* writs were in use under the common law, but those which are now in general use in this country are *capias ad satisfaciendum*, which commands the sheriff to arrest the person named and produce him in court on a day named to satisfy the party who has recovered judgment against him; and *capias ad respondendum*, which requires the sheriff to arrest the party named and produce him in court at the time named to answer the plaintiff's demand. Since imprisonment for debt is no longer permitted in this country, these writs are not now in use except where debt is contracted through fraud of the debtor or in actions of tort. See WRITS, Vol. XXIV, p. 695.

CAPIBARA, a rodent. See CAPYBARA, Vol. V, p. 80.

CAPILLARIES. See VASCULAR SYSTEM, Vol. XXIV, pp. 103, 107.

CAPITAL. See ARCHITECTURE, Vol. II, p. 461.

CAPITAL PUNISHMENT, in criminal jurisprudence, is the infliction of the punishment of death upon conviction of crime. This extreme penalty has formed a debatable proposition for modern jurists, statesmen, philosophers and philanthropists.

Applying the general rules of the ancients, Plato and Protagoras, those in favor of the retention of capital punishment base their arguments upon the fact that this punishment, more than any other, tends to deter men from committing the crime of murder. But statistics vary, and are of little value in proving this proposition.

The history and methods of inflicting the penalty vary with every nation. In the theocracy of ancient Israel many were the offenses punished capitally, for there was a taint of apostasy in disobedience of the law.

Among them are particularly to be noted dese-

cration of the Sabbath, blasphemy, idolatry, witchcraft, cursing, offerings to Moloch, disobedience to parents, murder, adultery, incest, and kidnaping a free person. For a time, in cases of homicide, the "avenger of blood" had a right of carrying out private vengeance, as a relic of the nomadic blood-feud; but "cities of refuge" were appointed to be safeguards against precipitancy, and eventually they substituted official jurisdiction for private revenge.

The feudalism of mediæval days was bloodthirsty. Each lord held his tenant's life in his hands. Treason was the certain avenue to execution, and nearly every offense was treason in the eyes of a feudal lord. Nor was England a whit better in this respect. Sturdy vagrants, counterfeiters, and those who "consorted for a month with Egyptians," all went to the gibbet in Tudor days. Benefit of clergy was the only loophole of escape, and the claim was allowed but once. Even "rare Ben Jonson" carried the "Tyburn T,' burnt in the ball of his thumb, as a reminder of the halter he escaped for manslaughter in a tavern brawl. Of the 160 capital offenses referred to by Sir William Blackstone, four fifths of them were so created and expressly enacted to be without benefit of clergy during the reigns of the first three Georges. That some idea may be formed of such Draconian justice as was established then, the following may be mentioned as among the offenses which involved sentence of death: Stealing, in a dwelling-house, to the amount of $10; stealing privately, in a shop, goods of the value of $1.25; counterfeiting the stamps that were used for the sale of perfumery; and doing the same with the stamps used for the certificates for hair-powder. So it was a capital offense to rob a rabbit-warren, to cut down a tree, to personate a Greenwich pensioner, or to harbor an offender against the Revenue Acts. It must, however, be remembered that the practice of the law for many years was less severe than the theory. Thus, while there were more than 200 offenses in the statute book for which capital punishment might be inflicted, there were only 25 offenses for which any one had suffered death during the preceding three quarters of a century.

Mainly to the exertions of Sir Samuel Romilly, England was indebted for the reformation of its criminal code. From 1808 to his death in 1818, Romilly strenuously continued his efforts to destroy this cruel system. Later, the cause of criminal reform found in Sir James Mackintosh a bolder and abler, if not more earnest, champion; and, aided by Peel, he secured legislation that reduced punishment by death to its present humane limits. In 1823, five statutes, exempting from capital punishment about a hundred felonies, were passed by both houses without a dissentient voice, and Peel's measures in 1826 to consolidate the criminal law were also humane. The punishment of forgery with death ceased in 1832–37. Since the statute of 1861 there remain in England only four capital crimes—setting fire to dockyards or arsenals, piracy with violence, treason, and murder. Practically it is only in the case of murder that the capital sentence is pronounced; and even then executive clemency occasionally commutes the sentence to life-imprisonment. With the change of severity came a change in methods, and the ribald horrors of public executions were abolished in 1868. The pens of Charles Dickens, Thomas Ingoldsby and Samuel Warren had not been employed in vain to satirize and scourge the shameless creatures who turned executions into saturnalia of debauchery.

Continental Europe has kept pace with reform in criminal law, the principal powers now restricting the death penalty to the gravest offenses. Public executions, however, are the rule rather than the exception. Hanging is the more usually employed method; but France retains the guillotine, and Spain the garotte. In Holland no person has been executed since 1860, and the death penalty was abolished by law in 1870. In Roumania it was abolished in 1864, and Portugal has adopted the same course. In Belgium the punishment of death practically is abolished, for, though the death sentence formally is retained, no execution has taken place in that country since 1863. In Switzerland, capital punishment was abolished in 1874, but, owing to a marked increase in the number of murders, by a federal decree of June 18, 1879, the cantons recovered the right of re-establishing the punishment of death in their respective territories. Seven of the cantons immediately took advantage of the permission, but the sentence of death seldom is passed in any of these cantons. In the remaining 15 cantons, including more than four fifths of the population of the republic, the death penalty remains totally abolished.

In many European countries in which the extreme penalty is authorized, the law has practically been abrogated by sentiments of humanity. Thus in Austria, owing to the repugnance of the Emperor to the death penalty, it has been enforced during his entire reign very rarely, and then in cases of atrociously brutal murderers. In Sweden, from 1870 to 1880, out of 32 sentenced to death, only 3 were executed; in Denmark, out of 94, only 1; in Bavaria, out of 249 committed for murder, only 7 were executed. In North Germany, during the 10 years from 1869 to 1878, 1,301 persons were convicted of "homicidal crime," and 484 of them were sentenced to death, but only 1 was executed—Hödel, who attempted the assassination of the Emperor William.

At the beginning of the nineteenth century the United States followed the ferocity of British statutes in the number of offenses incurring the death penalty. To-day the Federal laws are few and simple on the subject of capital punishment. In practice, the death penalty is exacted only in cases of murder, and then only after appeal to higher courts and after a refusal of executive clemency. Federal statutes are valid in territories, the District of Columbia, government reservations, the sea, Great Lakes and navigable rivers, and in cases arising under laws dealing with matters of interstate importance, as the mail service, etc. Even here the tendency is to grant territorial legislatures control over the punishment of crime, and to recognize a concurrent jurisdiction of the Federal and state

governments over felonies committed on reservations and waters within each particular state, under which the Federal courts release themselves, as far as justice will allow, from criminal prosecutions.

As regards the separate states, with four exceptions capital punishment is inflicted on conviction for murder. Michigan, Wisconsin, Rhode Island and Maine substitute imprisonment for life. Some of the Southern states add rape to the catalogue of capital offenses. Iowa and New York, after a trial of life-imprisonment, restored the death penalty for murder; and the latter, with Ohio, inflicts the penalty by electricity.

In the armies of the world, desertion, conviction as a spy, and the act of secretly communicating intelligence to the enemy are regarded as capital offenses, and punishable by either being shot or hanged—the latter being regarded as the more disgraceful mode of execution. In many of the navies of the world, the culprit, if he be an officer, is shot; if a seaman, he usually is hanged at the yard-arm.

The tendency in the present century has been to limit capital punishment to the greatest crimes only; but, on the other hand, there is a well-defined public sentiment demanding the social security that it is believed the death penalty alone affords.

This sentiment finds some justification in the large use or abuse of executive clemency in many states, under which atrocious crimes received undue leniency, and in the obstructions legal ingenuity can interpose to the conviction or execution of a murderer. Hanging does not, it is true, remedy these evils, but they do arouse a spirit of severity in the public mind, as the miscarriage of justice inevitably does.

Societies for the abolition of capital punishment exist and have many supporters; but until

> "the time of the New Sublime,
> And the better than human way,"

the removal of malefactors from the body politic, the welfare of which they endanger, will find advocates.

The literature on the question of capital punishment is learned and voluminous. Among the best-known works on the subject may be mentioned: Basil Montagu, *On the Punishment of Death* (1813); *Memoirs of Sir Samuel Romilly* (1840), and his writings; Bentham, *Rationale of Punishments* (1830); Beccaria, *Essay on Crimes and Punishments* (1775; Eng. trans. by Farrer, 1880); Berner, *Die Abschaffung der Todesstrafe* (1861); Mittermaier, *Die Todesstrafe* (1862; Eng. ed. by J. M. Moir); Von Holtzendorff, *Das Verbrechen des Mordes und die Todesstrafe* (1874); Clode's *Administration of Justice Under Military Law;* Professor Lorimer, *Institutes of Law;* W. A. Coppinger, *Capital Punishment* (1876); J. M. Moir's *Capital Punishment* (1865); Stephen's *History of the Criminal Law.* See also the publications of the Howard Association, London.

CAPITOL AT WASHINGTON, DISTRICT OF COLUMBIA. See ARCHITECTURE, in these Supplements.

CAPITOLIUM OR CAPITOL. See ROME, Vol. XX, pp. 824, 825.

CAPONIERE OR CAPONNIÈRE. See FORTIFICATION, Vol. IX, p. 439.

CAPON SPRINGS, a post-office and watering-place in Hampshire County, eastern West Virginia, on the Great North Spur of the Alleghanies, 17 miles W. of Winchester, Virginia. The scenery here is beautiful and trout abundant. Its springs are a warm solution of carbonated calcic; they are widely known, and considered to be highly beneficial. The population of Capon district in 1890 was 1,552.

CAPPARIDACEÆ, a family of dicotyledonous plants, allied to *Cruciferæ*, and including about 350 known species, mostly natives of tropical and subtropical countries. Many of the species possess stimulant properties, while some are poisonous. One of the most interesting plants of the family is the *Sirvâk*, a bush or small tree of Africa, the small berries of which have a pungent taste, like pepper. When dried they constitute an important ingredient in the food of the natives, and the roots, when burned, yield considerable salt. *Cleome* is a genus with showy flowers; *Polanisia* is sometimes planted for ornament; the flower-buds of *Capparis spinosa*, a climbing, thorny shrub of the Mediterranean region, are the well-known "capers." The family differs from *Cruciferæ* in that its stamens are not tetradynamous and may be numerous; the pods are not divided by a false partition, and the ovary is elevated upon a stalk which is sometimes very long.

CAPPEL, a village in the canton of Zurich, northern Switzerland, 10 miles S.W. of the city of Zurich Here the reformer Zwingli was killed in a conflict with troops of the Roman Catholic cantons in 1531. See ZWINGLI, Vol. XXIV, p. 833.

CAPRICCIO, in art, a term applied to a picture or other work which designedly violates the ordinary rules of composition. Foliated ornaments, with cupids or other figures appearing in them, in situations not strictly natural, are capriccios. In music, *capriccio* is a free composition, not conforming to rule as to form or figure. Locatelli, at the beginning of the eighteenth century, composed capriccios for the violin. The most celebrated capriccio of modern times is Mendelssohn's B minor capriccio for pianoforte and orchestra.

CAPRICORN, TROPIC OF, a circle in geography at lat. 23° 27′ S., the most southerly point at which the sun's rays are vertical, becoming thus at the winter solstice, December 21st. It corresponds to the tropic of Cancer in the north. It receives its name from the zodiacal sign *Capricorn*, where the ecliptic crosses the astronomical circle bearing a corresponding relation.

CAPRICORNUS, the Goat, a southern constellation and the tenth sign of the zodiac. It is usually represented as having the fore part of a goat, but the hinder part of a fish. The ancients regarded it as the harbinger of good fortune, and as marking the southern tropic, or winter solstice, wherefore they called it the "Southern Gate of the Sun." See ZODIAC, Vol. XXIV, p. 792.

CAPRIFICATION, a process used from the earliest times, by which branches of the sterile wild fig, or "caprifig," are suspended among the cultivated figs, to insure pollination. Sometimes, instead of using the branches, a few wild trees are planted among the others. The process of pollination is quite intricate. The "fig" is a flower-cluster in which the flowers are inclosed within an enlarged

receptacle, and access to them is only possible through a small opening at the top. The pollination is effected by a small gall-wasp. The female wasp enters the fig, lays an egg in each flower, and dies within the fig. Each flower then develops into a kind of gall. The male wasp is wingless, and entering the fig, bites a small passage into the ovaries containing young female wasps, and impregnates them. The impregnated females then escape from the fig, in some cases carrying pollen with them, enter other figs, lay their eggs and die. The presence of the pollen-bearing wild fig is thought to insure the transfer of pollen in these migrations of the wasp; though the necessity of this "caprification" is quite doubtful. J. M. COULTER.

CAPRIFOLIACEÆ, a family of dicotyledonous plants, allied to the *Rubiaceæ*, containing about 230 species, chiefly found in the northern hemisphere outside of the tropics. Among the genera are the elders (*Sambucus*), the honeysuckles and woodbines (*Lonicera*), the snowberries (*Symphoricarpos*), the bush honeysuckles (*Diervilla*), the arrow-woods (*Viburnum*), among which is the *V. Opulus*, or snowball tree.

CAPRIMULGIDÆ, a family of birds. See GOATSUCKER, Vol. X, pp. 711, 712.

CAPRIVI DE CAPRERA DE MONTE-CUCCULI, COUNT GEORG LEO VON, Chancellor of the German Empire, was born in Charlottenburg, Prussia, Feb. 24, 1831. He entered the Prussian army in 1849; served in the war of 1866 and the Franco-Prussian war, and became major-general in 1877. In Dec., 1882, he was given command of the third army division, with headquarters at Metz; from 1883 to 1888 was at the head of the admiralty; and then held command of the Tenth Army Corps, in Hanover. On March 19, 1890, he became Chancellor, in succession to Prince Bismarck. He revolutionized the commercial system of central Europe by a new series of commercial treaties, which laid the foundation for a central European customs union. Was made count in 1891, and retired from office Oct. 26, 1894. Died at Skyren, near Crossen, Feb. 6, 1899.

CAPRON, ALLYN, American army officer; born in Tampa, Florida, Aug. 27, 1846. On Sept. 1, 1863, he was appointed, from South Carolina, cadet at West Point, and graduated June 17, 1867, and was, on the same date, appointed second lieutenant of the First United States Artillery. He was made first lieutenant Aug. 19, 1883, and captain Dec. 4, 1888. In 1890 he was stationed at the Presidio, San Francisco. When, during the war with Spain, the invasion of Cuba was decided on, he was ordered to Santiago, where, at the battles of El Caney and San Juan, July 1 and 2, 1898, "Capron's battery," under his skillful and energetic command, greatly distinguished itself by its accurate and effective fire. Later, however, Captain Capron was stricken down with typhoid fever, and he was removed to Fort Myer, Va., where, on Sept. 18, 1898, he died. His son, ALLYN K., captain of Troop L of the Rough Riders, was killed in the battle at Las Guasimas, near Santiago, June 24, 1898. Captain Allyn Capron's father was killed during the Mexican War, at the battle of Churubusco, Aug. 20, 1847, while also in command of "Capron's battery."

CAPSICIN, an alkaloid, the active principle in capsicum or cayenne pepper, from which it is obtained. It is a thick liquid, of a reddish color, and possesses strong acrid properties. See CAYENNE PEPPER, Vol. V, p. 280.

CAPSULE, in anatomy, is a small casing-envelope, covering, etc., thin and membranous; a membrane or ligament inclosing some part or organ, as in a bag or sac; a sacular investment, as the capsule of the kidney; the capsule of the crystalline lens of the eye; the capsule of the joint of the hip. The capsule of the kidney is a smooth, fibrous membrane, closely investing the kidney, and forming its outer coat; the capsule of the lens is a transparent, elastic, brittle and structureless membrane, inclosing the lens of the eye; the "external capsule" is a layer of white nervous substance between the *claustrum* and the *putamen* of the brain; the "internal capsule" is a layer of nerve-fibers passing upward from the *crura cerebri* to the *cortex*, between the *caudate nucleus* and the *optic thalamus* on the one side, and the *lenticular nucleus* on the other. The word has also been extensively used for a small gelatinous case or envelope, in which nauseous medicines are wont to be inclosed, to aid in their being swallowed. Certain medicines are so offensive to the taste, and consequently so apt to sicken the stomach, that it is highly desirable to administer them in such a way as to prevent their contact with the tongue and palate. This object is fully accomplished by the use of *capsules*. They are made principally of gelatin, and of such thickness that before the nauseating medicine can be dissolved it is swallowed, and its unpleasant taste avoided.

CAPSULE, in botany, is a dry syncarpous fruit, opening either by valves, as in the rhododendron, or by pores near the summit, as seen in the poppy and snap-dragon. See BOTANY, Vol. IV, p. 152.

CAPTAIN (MILITARY), originally a head or leader, irrespective of the number of men under him, but now the commander of a company, whether of infantry, cavalry or artillery. In the German army, where the infantry companies consist of 250 men each, the captain is a mounted officer; in the British and United States armies he marches on foot with his men, who look to him for everything, both in barracks and in the field. In cavalry regiments the captain also deals individually with his men when in barracks, but in the field he works under the leader of the squadron of which his troop forms half. The badge of rank in the British army is two stars on each shoulder-strap; in the United States army, two bars. In the United States navy the title is given the officer who ranks next to the commodore and above commander. In the British navy he stands next to the rear admiral. In both navies he is entitled to the command of a ship. This naval rank corresponds to that of colonel in the army. The master of any merchant vessel is given the title.

CAPTION, as a legal term, signifies a formal heading or title to an indictment, deposition, bill or other legal document in which is set forth the time, place and by what authority and in connection with what matter it was taken or executed, and such other matters as may be required to render the instrument

legal and valid for use in the matter for which it is intended. Generally, such documents as indictments, affidavits, pleadings, process, depositions and other formal legal papers designed for use in court must bear a caption, in order to make them available for the use intended.

CAPUCHIN MONKEY, a name given to several South American monkeys of the genus *Cebus*. The hair on the head resembles the hood or cowl of a Capuchin monk.

CAPUDAN-PASHA OR CAPITAN-PASHA, the high admiral of Turkey. He has the entire command of the navy and the management of all naval affairs. The port of Pera, contiguous to the arsenal, the Turkish island in the Archipelago, and a number of seaports and maritime districts are under him, even in their civil administration.

CAPULETS AND MONTAGUES, the English spelling of the names of the Cappelletti and Montecchi, two noble families of northern Italy, according to tradition of Verona, chiefly memorable from their connection with the legend on which Shakespeare has founded his tragedy of *Romeo and Juliet*. They both belonged to the Ghibelline faction, as we see from a reference in canto 6 of Dante's *Purgatorio*. The first publication in which the essential incidents of Shakespeare's play appear is a novel by Luigi da Porto, printed at Venice in 1535. There is evidence that an English play founded on the same incidents appeared soon after, and that before Shakespeare's time the story was so well known in England that it had supplied subjects for tapestries.

CAPUT MORTUUM OR COLCOTHAR VITRIOLI, the name given by the alchemists to the red powder which remains in the retorts when green vitriol or the sulphate of iron is calcined. See COPPERAS, Vol. VI, p. 352.

CAQUETA, a river of Colombia. See JAPURA, in these Supplements.

CARABIDÆ, a tribe of beetles. See COLEOPTERA, Vol. VI, p. 129.

CARABOBO, a state and plain of northern Venezuela. The state borders on the Caribbean Sea. It lies west of Caracas, north of Portugueza and east of Barinas, states of Venezuela. It has an area of 2,984 square miles, and in 1891 had a population of 198,021. Its capital is Valencia, with a population of 38,654. The plain lies south of Valencia near the mountains. This plain is famous for two decisive victories gained there by Bolivar in the war for independence against Spain. The first of these battles was fought May 28, 1814, and the other June 25, 1821. The last completely routed the Spaniards, and gained for Venezuela its independence. See VENEZUELA, Vol. XXIV, p. 141.

CARACARA EAGLE (*Polyborus tharus*), a large bird belonging to the subfamily of carrion-buzzards, abundant in South America. It feeds on animal matter, whether fresh or putrid, and sometimes attacks young and weak animals. The name *carrancha* is often used.

CARACCA, a village of Andalusia, Spain, one of the chief naval arsenals of the kingdom, situated four miles S.E. of Cadiz. It has been completely detached from the mainland by artificial means; it is defended by four forts, and is altogether very complete as an arsenal. See CADIZ, Vol. IV, p. 627.

CARACCIOLI, PRINCE FRANCESCO, born about 1748, in Naples, of a noble Neapolitan family. He had risen to the supreme command of King Ferdinand's navy, when, in December, 1798, he fled with him, before the French, from Naples to Palermo. Learning, however, of the intended confiscation of the estates of all absentees, he obtained permission to return to Naples, where he entered the service of the "Parthonopean Republic," and was placed at the head of its marine. For two months he ably directed the operations of the revolutionists, and not until their cause seemed hopeless, though before the capitulation, did he quit the capital. He was captured in peasant disguise, and, June 29, 1799, was brought on board Nelson's flagship, tried by a court-martial of Neapolitan officers, and hanged from the yard-arm of a Neapolitan frigate.

CARACTACUS OR CARADOC. See BRITANNIA, Vol. IV, p. 353.

CARADOC SANDSTONE AND BALA BEDS, a division of the Lower Silurian system developed in Shropshire, England. See GEOLOGY, Vol. X, p. 332.

CARAFFA, the name of an ancient and famous Neapolitan family, to which several cardinals and Pope Paul IV belonged. Carlo Caraffa, nephew of Paul IV, was born in 1517, fought in the Netherlands, joined the Knights of Malta, and was made cardinal by his uncle. Paul subsequently banished the Cardinal and his brothers from Rome for extortion, and in 1561 Pope Pius IV caused him to be put to death. See PAUL IV, Vol. XVIII, p. 431.

CARAITES. See KARAITES, Vol. XIV, p. 2.

CARALIS, ancient Sardinian town. See CAGLIARI, Vol. IV, p. 640.

CARAMBOLA OR COROMANDEL GOOSEBERRY, the fruit of *Averrhoa carambola*, a small East Indian evergreen tree, belonging to the family *Geraniaceæ*. The berry is as large as a hen's egg, longitudinally ribbed, with a thin yellow rind, and pleasantly acid. The fruit known as "bilimbi" is obtained from *A. bilimbi*.

CARAMEL, the name applied to the dark brown and nearly tasteless substance produced on the application of heat to sugar. It is likewise formed during the roasting of all materials containing sugar, such as coffee, malt, etc., and is one cause of the dark color of porter and infusions of coffee. See SUGAR, Vol. XXII, p. 624.

CARAMURU, CARAMARU OR CORREA, DIEGO ALVAREZ, a Portuguese sailor who, with others, was shipwrecked in 1510 on the coast of Brazil, near Bahia. The Indians of the Tupinambá tribe killed all the others, but for some reason spared him. He became a chief in their tribe and lived among them until his death, Oct. 5, 1557. He was largely instrumental in securing for the Portuguese the right to settle Bahia.

CARANNA RESIN, a resinous gum extracted from a tree of the same name growing in Mexico and South America. Its properties and uses resemble those of tacamahac. It is entirely soluble in alcohol, and melts at a slight heat.

CARAPA, a genus of plants of the family *Meliaceæ*, found in tropical America and in Africa. *C. Guianensis* is a fine, large tree whose wood, called carapa-wood, or crab-wood, is used for making furniture, and also for the spars of ships; its bark is a febrifuge, and its seeds yield a lamp-oil, called carap-oil, or crab-oil. The African species (*C. Touloucouna*) yields an oil called coondi, kundah, or tallicoona, which is used by the natives for anointing their bodies, its bitterness protecting them from the bites of insects. The oil of the South American carapa is sometimes used for the same purpose. See OILS, Vol. XVII, p. 746.

CARAPACE, the dorsal shield or buckler of chelonian reptiles (tortoises and turtles), and of crabs, lobsters, etc. See TORTOISE SHELL, Vol. XXIII, p. 460.

CARAPANOS, CONSTANTIN, Greek archæologist; born in Arta d'Epire, province of Ambracie, Greece (then under Turkish rule), March 13, 1840. He became an *attaché* of the Turkish embassy at Paris, but in 1864 gave up his diplomatic career to assume the duties of secretary of the first large banking establishment at Constantinople founded by native bankers. In connection with this financial institution, he was prominent in the great industrial and other reforms of his country, and was instrumental in securing the transfer, in 1878, of the provinces of Epirus and Thessaly from Ottoman to Hellenic control, becoming thus a Greek citizen. In 1878, when he began to have some leisure, he took up again the archæological studies of his youth. On his own estates in Epirus, he directed the excavations which resulted in the discovery of the ruins of the Temple of Dodo. He has published a work on the *Ruins of Dodo* (1878). He is a correspondent of the French Antiquarian Society and the Berlin Archæological Institute.

CARAT, a term applied by goldsmiths and assayers to the twenty-fourth part of a troy pound, ounce, or any other weight, as a means of stating the proportion of pure gold contained in any alloy of gold with other metals. Thus, pure gold being considered as 24 carats fine, gold containing two parts of alloy is called 22 carats fine, or 22-carat gold. The carat used in this sense has, therefore, no absolute weight; it merely denotes a ratio. The gold used by jewelers is seldom over 18 carats fine, except in wedding-rings, the standard fineness of which is 22 carats. The so-called gold used for jewels, watch-cases, etc., varies from 8 or 9 to 18 carats fine. The jewelry carat, used as a unit for weighing diamonds and other precious stones, is quite different. It has a fixed weight, equal to 3.174 troy grains, and is divided into quarters, or "carat grains," eighths, sixteenths, etc. These carat grains are thus less than troy grains, and therefore the jeweler has to keep a separate set of diamond weights. This weight was fixed in 1877, by a syndicate of Amsterdam, London and Paris jewelers, at 205 milligrams, and is known as the *Amsterdam* or *diamond carat*. See DIAMOND, Vol. VII, p. 166.

CARAUSIUS, a British emperor. See BRITANNIA, Vol. IV, p. 353.

CARAVAGGIO, a town of Lombardy, Italy, about 24 miles E. from Milan. Population, 5,880. Three famous painters were born here—Fermo Stella, Polidoro Caldara (see Vol. V, p. 83), and Michel Angelo Amerighi (see Vol. V, p. 82). In the neighborhood is a sanctuary of the Madonna, built from designs of Pellegrini.

CARAVEL, a light, round, old-fashioned ship, with a square poop, galley-rigged, formerly used in

THE CARAVEL SANTA MARIA.

Spain and Portugal. The term is now applied in France to a small herring-fishing boat; in Turkey to a large ship-of-war; and in Algiers to a frigate. The modern junk of the Japanese approaches most nearly the caravel of the time of Columbus. At the time of the celebrations in 1892 and 1893 of the discovery of America by Columbus, caravels, exact reproductions of the ships in which Columbus sailed, were a very interesting part of the naval exhibitions. The largest of the three vessels, the *Santa Maria*, had a double deck fore and aft, was 75 feet in length, drew but 4 feet 10 inches of water, and had a tonnage of 125.57.

CARBAZOTIC OR PICRIC ACID, a substance of great importance in dyeing. It is a combination of nitric or sulphuric acid with carbolic acid. See CARBOLIC ACID, Vol. V, p. 85.

CARBOHYDRATES. See CHEMISTRY, Vol. V, pp. 564, 565.

CARBON, a village of Carbon County, southern Wyoming, on the Union Pacific railroad, about 80 miles N.W. of Laramie. It is the trade center of a rich mining district, and is almost exclusively engaged in business tributary to the mining interests of the surrounding country. Population 1890, 1,400.

CARBONADO OR BLACK DIAMOND, an amorphous variety of carbon, brown or black in color, found in Brazil in connection with pure diamonds, and extensively used in diamond drills. See DIA-

MOND, Vol. VII, p. 163; and MINERALOGY, Vol. XVI, p. 381.

CARBONDALE, a city and railroad junction of Jackson County, southern Illinois, 57 miles N. of Cairo by the Illinois Central railroad, also on the Chicago and Texas railroad and the St. Louis, Alton and Terre Haute railroad. The Southern Illinois Normal University is located here. The trade of the city is principally in building-stone, tobacco, cotton, lumber, farm products and coal. Population 1890, 2,382.

CARBONDALE, a city and railroad junction of Osage County, central eastern Kansas, 16 miles S. of Topeka by the Atchison, Topeka and Santa Fé railroad. It has extensive coal-mines. In 1895 the population was 683.

CARBONDALE, a city of Lackawanna County, northeastern Pennsylvania, on the Lackawanna River, 16 miles N.N.E. of Scranton, and on the Delaware and Hudson, the New York, Ontario and Western, and the New York, Erie and Western railroads. The mines of the neighborhood are worked by the Delaware and Hudson Canal Company, and yield about 900,000 tons annually. It is supplied with electric lights and motor power, gas and water. The population of the city was, in 1880, 7,714; in 1890, 10,826. See Vol. V, p. 89.

CARBONIC ACID. See under CARBON, Vol. V, p. 88.

CARBONIC OXID OR OXIDE. See CARBON, OXIDES OF, Vol. V, p. 87.

CARBONIFEROUS PERIOD. See GEOLOGY, Vol. X, pp. 346–350.

CARBON THEORY OF STEEL. See IRON, in these Supplements.

CARBORUNDUM. See CHEMISTRY, in these Supplements.

CAR-CONSTRUCTION, ELECTRIC. Street-cars are being made larger and stronger each year, as the patronage of electric railways increases. To a great extent their manufacture has taken the place of car-building for steam-railways, the latter industry having suffered a most marked decline. The frames of trolley-cars have to be built especially strong, for several reasons—the roof has to bear the jerks of the trolley-pole, the floor-frame has to support powerful brake-mechanism, and the bracing has to withstand the shocks incident to the sudden stops which are often required. The cross-timbers of the floor-frames have to be arranged so as to avoid the motors, and so as to contain trap-doors through which the motors can be removed entire when needed. All the principal woods are used in their manufacture, though oak and hard pine predominate. Concealed steel rafters are commonly used to strengthen the roofs. The average length of trolley-cars is now about 25 feet, but the tendency is toward increased length. The principal styles made are motor, trailer and mail cars; also, open, closed, vestibule, convertible and combination styles. Notwithstanding increased size and strength, the weights are kept down, varying mostly between 3,000 and 5,250 pounds. The electric mail-car was first introduced in Boston, and, proving successful, has been placed on lines in several other large cities of the United States. Among the most recent improvements in electric cars, that of electric-heating commands much attention. Coils are placed under the seats, and, the current being turned on, the heat escapes into the car through gratings. When this system of heating is used on a vestibule-car, having no doors directly at the ends to cause chilling blasts to sweep through, it is possible to keep a car comfortably warm in quite cold weather. In some recent styles of cars, electric buttons are placed at intervals, by means of which passengers may signal when they desire to stop the car. Improved forms of fenders and brakes are being applied. See BRAKE, in these Supplements.

C. H. COCHRANE.

CARBURETER. The principal gas companies now employ gasolene extensively for raising the illuminating power of their gas. In the Maxim apparatus, patented in 1889, the gasolene is evaporated by heat, so as to obviate any fractional evaporation or any variation of the amount volatilized, due to differences in temperature of the air or gas. The extent of evaporation is automatically regulable. With this carbureter the enrichment of the gas is the same, no matter how many or how few burners are being supplied, and no deposition of liquid takes place if the temperature of the enriched gas is kept below 50° F.

In the Maxim and Sedgwick carbureter the gasolene is vaporized by steam supplied from a generator. This vapor is mixed with a proper proportion of gas drawn from the main at a convenient point, and afterward returned to it. The method of mixing is to force the gasolene vapor out of an injector in such manner that it draws a quantity of unenriched gas from the main by means of the partial vacuum created, and this, mingling with the gasolene vapor, becomes enriched, the extent of such enrichment being easily controlled.

The Simplex carbureter is largely used in the manufacture of air-gas. In this, hot water and a brush are made use of, to vaporize the petroleum.

C. H. COCHRANE.

CARCANO, GIULIO, born in Milan, Italy, Aug. 7, 1812; died Sept. 5, 1884. He was brought to public notice in 1835 by his novel, *Ida della Torre*. He was banished in 1849; but on the establishment of national independence he was appointed inspector of schools, and held several important offices under the government. He was a poet and novelist of much merit. He made a faithful translation into Italian of the dramatic writings of Shakespeare.

CARCASS, in military pyrotechny, a hollow case of iron filled with combustibles. It is fired from a mortar. Its chief use is to ignite the enemy's buildings, and to give sufficient light to aim the shot and shells. Carcasses were first used by one of the princely ecclesiastics, the Bishop of Münster, when he fought against the Duke of Luxemburg at Groll, in 1672. They do not burst, but send out an inextinguishable fire through holes in the shell. They burn from 3 to 10 minutes. The fuses are inserted in the holes and are adjusted in length to suit the time taken in firing. The composition with which the carcass is filled consists for the most part of saltpeter, sulphur and pitch.

CARCEL LAMP, invented in 1800 by Carcel, a Frenchman; burns colza oil; is used in lighthouses and photometry. The oil is pumped to the wick by clockwork arranged to go a certain time. In France the flame is taken as the standard of illumination.

CARDBOARD, a stiff compact pasteboard made by pasting together several layers of paper, according to the thickness and quality required. *Bristol-board*, used by artists, is made entirely of white paper; ordinary cardboard, of fine white paper outside, with one or more sheets of coarse cartridge-paper between; while fine cards are enameled with a coating of size, and polished with a stiff brush.

CARDENAS, a town and bay on the north coast of Cuba, in Matanzas province, about 80 miles E. of Havana. Population of town (1887), 23,354. (See Vol. V, p. 92.) On May 11, 1898, the bay was the scene of a naval action in the war with Spain, in which the United States gunboats *Wilmington* and *Machias*, the torpedo boats *Winslow* and *Foote*, and the revenue tug *Hudson* took part against some Spanish gunboats and shore batteries, and in which Ensign Bagley and others on board the *Winslow* were killed, and Lieut. John J. Bernadou, commander of the *Winslow*, and others were wounded.

CARDIADÆ OR CARDIIDÆ. See COCKLE, Vol. VI, p. 100.

CARDIFF, town in Onondaga Co., N. Y., chiefly notable for the pretended discovery of the "Cardiff Giant," a statue carved in Chicago from a block of Iowa gypsum, buried at Cardiff, and then dug up and exhibited as a petrified giant. Pop. 1890, 5,135.

CARDINAL, the highest dignitary in the Roman Catholic Church after the pope. (See CARDINAL, Vol. V.) Cardinals are divided into three orders, bishops, priests, and deacons. First in chronological order came cardinal priests, then cardinal deacons, and lastly cardinal bishops. There have been, also, cardinal sub-deacons, but since the time of Alexander III we find no mention of them. The order of cardinal priests seems to have originated thus: St. Cletus (elected pope A. D. 78), the second successor of St. Peter according to *Liber Pontificalis*, divided the city of Rome into districts, each with its own priest. Pope Evaristus confirmed this division into parishes, or titles, and the priests who were incardinated, or entitled, in these churches were afterward called cardinal priests. The origin of cardinal deacons is more obscure. Pope Clement, in A. D. 92, appointed seven deacons, similar to those mentioned in the Acts, to preside over the seven districts into which he divided Rome, and to their care he confided the *diaconiæ*, that is, hospitals or houses where widows, orphans, and the poor in general were supported out of the patrimony of the church. Later, the number of deacons was increased to 14, each of whom was assigned to a deaconry, and who were known as cardinal deacons of the Holy Roman Church. The admission of cardinal bishops into the College of Cardinals seems to have taken place not earlier than the year 731. Before that time the bishops of the churches surrounding Rome may have been consulted by the pope concerning affairs of the universal church, but they were not considered part of the presbytery or chapter of the Roman Church, nor were they called cardinals. Gregory III, however, appointed seven bishops to officiate by turn in the cathedral of St. John Lateran, and thus instituted the order of cardinal bishops. The number later was reduced to six, and these bishops were appointed to the suburbicary churches or dioceses of Ostia and Velletri, Porto and Santa Rufina, Frascati, Sabina, Palestrina, Albano, making six in all. The bishops of these dioceses, and they alone, are cardinal bishops of the Holy Roman Church. The essence of the cardinalate consists in the right and duty of assisting the Roman pontiff in ruling the universal church, and in case of vacancy in the Apostolic See of supplying his place until the election of a new pope. These duties are performed by the cardinals as a body, not as individuals, so that the corporate or collegiate form is of the essence of the cardinalate. The name, privileges and the various accessory duties of the cardinalate have undergone great changes in the course of ages, but its essential characteristic has been traced back to apostolic times by not a few writers, as appears from the Council of Constance, held in 1417. The dignity of the cardinalate is, after that of the pope, the highest in the church. It is greater than that of bishops, archbishops, primates, or even patriarchs. Whether this precedence was obtained by cardinals only in the eleventh or twelfth century, or whether by right and in fact they always held it, is a controverted question. Bellarmine, Baronius, Thomassin, maintain the former opinion, as do also Cohellius, Petra and Ferraris, who all wrote specially on this subject. Natalis Alexander claims that only under Innocent IV, in the year 1243, did cardinals obtain the right of precedence in session over bishops. All these writers claim that the precedence of the cardinals of the Holy Roman Church over all other dignitaries was only of gradual development. The question of precedence was specifically determined by Pope Eugene IV, in his bull *Non Mediocri*, by which he gives precedence to John Kemp, bishop of York and cardinal of the Holy Roman Church, over Henry, Archbishop of Canterbury, primate of England and legate-born of the Holy See. Later, in the year 1449, the Archbishop of Gneisen, primate of Poland, was made yield precedence to Cardinal Sbigneo, bishop of Cracow. Precedence among the cardinals themselves is regulated by the order of cardinal bishop, cardinal priest or cardinal deacon, to which they belong, and seniority in creation.

For the creation of a cardinal, all that is required is the will of the sovereign pontiff sufficiently expressed. Neither a certain form nor any special ceremony is essential, because the whole substance of the cardinalate consists in the power of jurisdiction, and its consequent prerogatives, which depends simply on the will of the superior. The cardinalate is not, like the priesthood, a sacrament. Since the publication of the decree of Pope Pius V, it is certain that cardinals obtain all cardinalitial rights the moment they are appointed in secret consistory, unless the pope makes special mention to the contrary. If the newly appointed cardinals are in Rome, they proceed in their usual dress without any attendants to the Apostolic Palace, where one of the

old cardinals presents them to the Holy Father, who gives them the red cap, or beretta. But if a newly appointed cardinal is absent from Rome, one of the attendants of the Pope is dispatched at once to carry him the red beretta, in receiving which the new cardinal must promise on oath, under pain of deprivation of the cardinalate, that within a year he will proceed to Rome to visit the Holy Father. A public consistory is then called for giving the insignia to the new cardinals. In another consistory, the pope closes the mouths of the new cardinals, prohibiting them from speaking in consistories and other meetings until their mouths are opened again. Then, again, in another consistory, the pope orders the new cardinals to retire, while he asks the older cardinals whether they think the new cardinals should have their mouths opened. And, all assenting, the new cardinals are called back and kindly admonished by the Holy Father, who then opens their mouths, with these words: "We open your mouth both in conferences and in councils and in the election of the sovereign pontiff, and in all acts which both in and out of the consistory pertain to cardinals. In the name of the Father, and of the Son, and of the Holy Ghost, amen." Then finally the ring is given, and the title or church assigned to each new cardinal.

The title of a cardinal is the church in the city of Rome to which he is appointed. Cardinals, who are at the same time ordinaries or bishops of dioceses are obliged to reside, not in their titular churches in Rome, but in their dioceses. Though such cardinals cannot fully assist the Pope, still they can give some help, and it has long been the custom that quite a number, sometimes reaching nearly one half of the seventy cardinals, are selected from among such bishops as are obliged to reside in their own dioceses. Cardinals retain the title assigned them until by right of option, they acquire a higher, cardinals of a lower order having the right to ascend to a higher one. Thus the vacancies in the six suburban sees are always filled, not by an election, but by the right of option; according to seniority in the cardinalate. Thus, too, the oldest cardinal bishop who is present in the papal court becomes dean of the Sacred College as soon as a vacancy occurs. This cardinal is always the Bishop of Ostia, and he has the privilege of consecrating the newly elected pope if, when chosen, he is not yet a bishop.

Cardinals have many privileges, but chief among them is the precedence all of them have over bishops, archbishops, primates and patriarchs. They have also the exclusive right to the titles "Eminence" and "The Most Eminent," and everywhere rank with princes of the royal blood. At present cardinals have the exclusive right of electing a new pope when a vacancy occurs. (See CONCLAVE, in these Supplements.) In this election they are obliged strictly to follow the laws made before the vacancy. Further, it may be observed that while the pope usually consults with the cardinals, still neither their consent nor advice is necessary for the validity of papal acts. The College of Cardinals is a corporate body, and has as secretary a prelate who keeps its records, and a cardinal camerlingo who attends to its property. Still, as a college, it may not meet without the previous permission of the pope. The selection of cardinals is optional with the pope. Still, certain positions in the papal court are supposed to prepare the way to the cardinalate, and are thus termed cardinalitial positions. Such are nunciatures to the greater nations. Among the cardinals there should be at least four from the regular and mendicant orders, according to the bull of Sixtus V, and finally, according to the mind of the Council of Trent, the cardinals, as much as can be, should be selected from all the nations of Christianity. Following the wish of the council, the Roman pontiffs now promote to the dignity of the cardinalate select men from various regions, but particularly from Catholic nations.

P. A. BAART.

CARDINAL–BIRD, also called cardinal grosbeak. See GROSBEAK, Vol. XI, p. 209.

CARDINAL–FLOWER, a name applied to *Lobelia cardinalis* on account of showy deep red flowers. Indigenous in the United States, in wet or low grounds, but often cultivated for ornament. It has a tall, simple stem, alternate lance-oblong leaves, and an erect raceme of showy flowers, which sometimes vary from deep red to rose-colored or even white.

CARDINGTON, a village of Morrow County, northern central Ohio, on the Olentangy River, 38 miles N. of Columbus, on the Cleveland, Cincinnati and St. Louis railroad, in a fertile agricultural district. It contains manufactories of flour and woolens. Population 1890, 1,428.

CARDITIS, or inflammation of the heart, a form of disease of very rare occurrence, if the term be limited in its application to cases of true acute inflammation of the muscular structure of the heart itself. Carditis, however, was formerly understood in a wider sense, so as to include certain forms of disease of the external and internal lining membrane of the heart. See HEART, Vol. XI, p. 554

CARDOON, a vegetable. See HORTICULTURE, Vol. XII, p. 280.

CARDUCCI, GIOSUÈ, Italian poet; born July 26, 1836, at Val di Castello, near Pietrasanta, in the province of Pisa. His youth was spent in study, and at the age of 25 he was appointed to a professorship in the University of Pisa, from which he was transferred in 1860 to a chair in the University of Bologna. He has been throughout his life a stanch republican, and in 1867 was for a short time suspended from his professorship for having signed an address to the patriot Mazzini. In 1876 he was returned to the Italian Parliament as member for Lugo di Romagna. His earliest poems, *Juvenilia* and *Levia Gravia*, contrast strongly with his later works. Signs of a transition in sentiment and in style appeared in the *Decennalia*, which dealt mainly with political events of the years 1860–70. The change became complete in the *Nuove Poesie*, in which he gave expression to the most advanced political views. These poems are remarkable for the sustained power and dignity of the language and the frequent nobility of the thought. The *Odi Barbare*, written in meters borrowed from Horace, are

very popular with Italians, but to foreign critics Carducci seems in these pieces to have erred in the rejection of rhyme.

CARDWELL, EDWARD, VISCOUNT, English statesman; born in Liverpool, July 24, 1813; died Feb. 15, 1886. He was educated at Oxford, where he became professor of ancient history. He was elected to Parliament in 1842 as a member of the party known as Peelites, and was president of the Board of Trade from 1852 to 1855. In 1855 he was returned to Parliament for Oxford. He became Secretary for Ireland in 1859, and Secretary of State for the Colonies in April, 1864, but resigned with his colleagues in June, 1866. In December, 1868, he entered the Cabinet of Gladstone as Secretary of State for War, and while occupying this position introduced important reforms in the army. He was raised to the peerage in 1874.

CARE OR CARLE SUNDAY, the Sunday before Palm Sunday, said to be so called because it was the practice in many places to eat gray peas, called carlings, which were steeped all night in water and fried the next day in butter. This practice apparently had its more immediate origin in the custom of the Roman Catholic people of eating hallowed beans at this time. The beans are described in some religious books as symbolical of confession, and their steeping before use of meditation. It appears to have been adapted from a heathen custom.

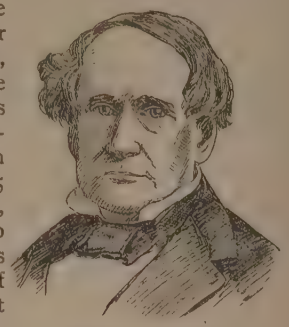
CARÊME, MARIE ANTONIN, French cook and author; born in 1784 in Paris; died there in 1833. He wrote *Les Déjeuners de l'Empereur Napoléon*, *La Cuisine Française*, and other works connected with his craft. As Talleyrand's cook he played an important part at the Congress of Vienna. He was also cook to the Czar Alexander and George IV of England.

CARETTE, ANTOINE ERNEST HIPPOLYTE, French military officer and writer, was born May 25, 1808. He entered the Polytechnic School in Paris in 1828; took an active part in the revolution in July of that year. Joining the army, he took part in the Algerian campaigns. There he became interested in ancient African history, and was accorded especial mention for his writings on that subject by the French Institute. He was a member of scientific expeditions to Algiers in 1840–42. After the revolution of 1848 he participated in the discussion of the Algerian question, and was defeated for the Chamber of Deputies at the elections under the constitution. In 1852 he was appointed chief of a battalion of engineers and colonel in 1863. He retired in 1868. He was made a commander of the Legion of Honor in 1867.

CAREX, a very large genus of plants of the family *Cyperaceæ*, commonly known as sedges. They are all of a grassy or rush-like appearance, and have some value in the economy of nature as forming the principal part of vegetation in swamps, which they assist in converting into fertile ground. The stems are triangular, and the staminate and pistillate flowers are separated from each other in the same cluster, or in different clusters on the same plant, or, rarely, on different plants. A characteristic feature of the genus is the *perigynium* which incloses the pistil as a more or less inflated sac.

CAREY, a village of Wyandot County, north central Ohio, on the Columbus, Hocking Valley and Toledo, the Northern Ohio and the Cleveland, Chicago and St. Louis railroads. By the last it is 16 miles S. of Tiffin. It contains manufactories of lumber and iron. Population 1890, 1,605.

CAREY, HENRY CHARLES, an American political economist, son of Matthew Carey; born in Philadelphia, Pennsylvania, Dec. 15, 1793; died there, Oct. 13, 1879. At the age of 21 he became a partner in his father's business, and later was head of the publishing house. He was the originator of the system of trade sales between book dealers. In 1835 he retired from business, and devoted himself to scholarly pursuits. He was the founder of a school of political economy. At first he was a free-trader, but he came to believe protection the best fiscal policy for the government. He was a member of the Republican party from its formation, supported the Union during the Civil War, was a trusted adviser of Mr. Lincoln and Mr. Chase, and was a member of the constitutional convention of Pennsylvania in 1872. He bequeathed his valuable library to the University of Pennsylvania. His first work was *The Principles of Political Economy*. He afterward wrote *The Credit System of France, Great Britain, and the United States; The Past, the Present and the Future; Principles of Social Science; Letters on International Copyright; The Way to Outdo England Without Fighting Her; Miscellaneous Works;* and *The Unity of Law*. See POLITICAL ECONOMY, Vol. XIX, pp. 384, 385.



HENRY C. CAREY.

CAREY, JOSEPH M., a United States Senator from Wyoming; born in Milton, Delaware, Jan. 19, 1845; graduated at Union College, New York; was admitted to the bar in 1867; United States attorney for Wyoming in 1869; engaged in stock-raising; associate justice of the Wyoming supreme court in 1871; from 1885 to 1890 member of Congress; elected to the Senate in 1890, retiring in 1895.

CAREY, MATTHEW, publisher; born in Ireland, Jan. 28, 1760; died in Philadelphia, Pennsylvania, Sept. 16, 1839. He was well educated, and selected as his life-work the printing and bookselling business. Among his first pamphlets was an inflammatory address to Irish Catholics, which obliged him to flee to Paris to escape trouble. Here he made the acquaintance of Benjamin Franklin. He returned after a year to Ireland, where he established the *Volunteer's Journal*, a newspaper very bold in tone, which became a political power. In 1784 an attack on Parliament brought on a suit for libel, and he was imprisoned. He sailed to the United States after his liberation, and within two months had started a newspaper, *The Pennsylvania Herald;* in this first appeared accurate reports of legislative deliberations.

For six years he published *The American Museum.* He founded the Hibernian Society, and assisted in the formation of the first American Sunday school society. He published, in 1814, the *Olive Branch; or, Faults on Both Sides, Federal and Democratic*, a work designed to conciliate the different factions in the United States which disagreed on the subject of the War of 1812. He issued, in 1820, the *New Olive Branch*, and two years later appeared his well-known work, *Essays on Political Economy*, which was followed by a series of tracts advocating the protective system, as necessary for the good of all classes.

CARIACOU, a name often applied to deer of the genus *Cariacus.* The common white-tailed or Virginia deer of North America is a member of the genus.

CARIAMIDÆ, a family of South American birds, composed of the genus *Cariama.* In structure they are extremely generalized, and intermediate between the cranes and the birds of prey (*Accipitres*). They are sometimes domesticated.

CARIBBEE BARK OR PITON BARK, the bark of *Exostemma Caribbæum*, a small tree of the West Indies and of Mexico, belonging to the natural order *Cinchonaceæ.* It is one of the barks sometimes substituted for the cinchona barks.

CARIBOO, a once famous placer gold-mining district, in the northern part of British Columbia, at the sources of the Stikeen and Liard rivers. It is now almost entirely deserted, except by a few industrious Chinese, who make fair livings by washing over the tailings from the old diggings.

CARIBOU. See DEER, Vol. VII, p. 25.

CARIBOU, a village in Aroostook County, northern Maine, on the Aroostook River, 20 miles above its junction with the St. John River. It is situated on the Boston and Maine and the Bangor and Aroostook railroads. Its principal industry is agriculture, though it has starch, carriage, sash and door factories, lumber and shingle mills, grist-mills, and a foundry; has water-works and electric lights. Population of Caribou township in 1890, 4,078.

CARILLON, a set of bells arranged for striking in such a way as to produce tunes. The set usually varies from 12 to 20. Eight bells and more are called a chime; less than these, a peal. The apparatus by which a carillon is played is called a clavecin, and a recent form of this is operated by electricity, current contacts being produced by a piano key-board that may be placed in any convenient position. The term *carillon* is sometimes applied to the music produced by or arranged for chiming. See BELL, Vol. III, p. 538.

CARINARIA, a remarkable genus of gasteropodous mollusks, of the order called *Heteropoda* or *Nucleobranchiata*, having a thin shell, in form somewhat like that of a limpet. The shells of some of the species have been denominated Venus's-slipper. The body is gelatinous, and so transparent that much of its interior organization can be seen. The species are all marine. See MOLLUSCA, Vol. XVI, p. 654.

CARINATÆ, the group of birds having keeled breastbones. See BIRDS, Vol. III, p. 699; ORNITHOLOGY, Vol. XVIII, p. 44.

CARINI, ISIDORE, premier préfetto at the Vatican Library; born in Palmero, Sicily, Jan. 7, 1843; became a priest in 1866; in 1875, canon of the Cathedral of Palermo; in 1877, professor of paleography and curator of the Archives of Palmero; in 1882, sent to Spain by the government to collect information on the Sicilian vespers; in 1884, assistant archivist and professor of paleography at the Vatican School in Rome; in 1889, appointed premier préfetto at the Vatican Library. He has published numerous writings on religion, bibliography and subjects in archæology.

CARINUS, MARCUS AURELIUS, a Roman emperor; elder son of Emperor Carus; raised to the throne in A.D. 283, by his father, who left him in the west and went with his younger son, Numerianus, against the Persians. On the death of Carus the same year, both brothers succeeded to the purple. Numerianus was slain in 284, and Carinus marched to oppose Diocletian in Mœsia, defeating him, but was assassinated in 285, by one of his officers, whose wife the emperor had betrayed.

CARISSA, a genus of plants of the family *Apocynaceæ. Carissa Carandas* is a thorny shrub, much used for fences in India. The fruit, called carandas, is a berry about the size of a small plum, and is used for tarts and preserves.

CARLÉN, EMILIA SCHMIDT (FLYGARE), a Swedish novelist; born in Strömstad, Aug. 8, 1807; died at Stockholm, Feb. 5, 1892. Her first novel, *Waldemar Klein*, appeared in 1838. She was then a widow, having been married in 1827 to M. Flygare. In 1841 she was again married to J. G. Carlén, a lawyer and a poet. Her literary productiveness was remarkable; many of her works were translated into English, French, and German, and circulated in both Europe and America. These works include *The Rose of Tistelen; The Representative, A Warehouse on the Cliffs* (1860); and *A Name.*

CARLETON. See COFFIN, CHARLES CARLETON, in these Supplements.

CARLETON, SIR GUY, Lord Dorchester, a British soldier; born in Strabane, Ireland, Sep. 3, 1724; died at Maidenhead, England, Nov. 10, 1808. He fought gallantly at Louisburg, Quebec, Belle Isle and Havana. From 1772 to 1775 he governed Quebec. He led the expedition which invaded New York in 1776, and in 1781 was appointed commander-in-chief of the British army in place of Sir Henry Clinton.

CARLETON, THOMAS, brother of the preceding, and also a soldier; born in 1736; died in Ramsgate, England, Feb. 2, 1817. He served in Wolfe's regiment in 1755; was appointed quartermaster of the army in Canada; with his brother in the naval conflict with Benedict Arnold on Lake Champlain; appointed lieutenant-governor of New Brunswick; and in 1784 governor and commander-in-chief of Nova Scotia and Canada. He remained in America 19 years; for 14 years after his return to England he retained those offices, the administration being carried on by his deputies. He was advanced in military rank, and in 1803 he was made a general in the British army.

CARLETON, WILLIAM, poet; born in Hudson,

Michigan, Oct. 21, 1845. He graduated at Hillsdale in 1869, visited Europe in 1878 and 1885, and is well known by his ballads of rural life. He has lectured in England, Canada and some parts of the United States. His collections of published poems are entitled *Farm Ballads; Farm Legends; Young Folks' Centennial Rhymes; Farm Festivals;* and *City Ballads.*

CARLETON COLLEGE, organized in 1870, at Northfield, Minnesota; conducted by the Congregational Church; president in 1895, James W. Strong; the same year there were 22 in the faculty and 277 students; 12,000 volumes in the library. From its organization till the year 1895, 229 have graduated.

CARLETON PLACE, a town of Lanark County, eastern Ontario; on a navigable stream called the Mississippi River, and on the Canadian Pacific railroad, 28 miles S.W. of Ottawa. There are manufactories of iron and woolens, and a large number of lumber-mills. Population 1891, 4,435.

CARLINE THISTLE, a name applied to species of *Carlina*, a genus of plants of the family *Compositæ.* The name is said to be derived from a legend, that an angel showed the root of one of the species to Charlemagne as a remedy for a plague. This particular species (*C. acaulis*) grows on hills and mountains in the middle latitudes of Europe. It has a very short stem and very large heads of flowers.

CARLING, Sir John, Canadian senator and statesman; born in London, Ontario, Jan. 23, 1828; a member of the brewing firm of Carling and Company; director of the Great Western and auxiliary railways; elected to the general assembly of Ontario in 1857; Receiver-General in 1862; member of the House of Commons from 1867 to 1874; Minister of Public Works in 1867–71; Postmaster-General from 1882 to 1885; then became Minister of Agriculture, holding the office until 1892. After 1892 he was a member of the Cabinet without holding a special office. He was appointed to the Senate in 1891, but resigned in 1892, and was elected to the House of Commons.

CARLING SUNDAY. See Care or Carle Sunday, in these Supplements.

CARLINVILLE, city and capital of Macoupin County, southwestern Illinois, on the Litchfield, Carrollton and Alton and the Chicago and Alton railroads; 54 miles N.N.W. of St. Louis. Blackburn University is here located, and there is also a theological seminary. Coal is found here. Population 1890, 3,293.

CARLISLE, capital of Nicholas County, northeastern Kentucky, on the Louisville and Nashville railroad, 17 miles N.E. of Paris. Its principal industries are carriage-making and flour-milling. Population in 1890, 1,081.

CARLISLE, borough, and the capital of Cumberland County, southern central Pennsylvania. (See Vol. V, p. 110.) It is situated on the Philadelphia and Reading and the Cumberland Valley railroads; by the latter, 18 miles W.S.W. of Harrisburg. It is well laid out; has wide streets, electric lights and water-works. It has car-shops, switch-works, shoe and carpet factories. It is the seat of Dickinson College; also of the Carlisle Indian School, an institution founded in 1879 and supported by the government; has had under its care 2,500 students, of whom some 150 have been graduated. Their training is to a great extent industrial. The pupils make their own uniforms, and much of the work of the school is done by the students. Carlisle also has some fame for its sulphur springs, four miles north of the borough. Population 1890, 7,620.

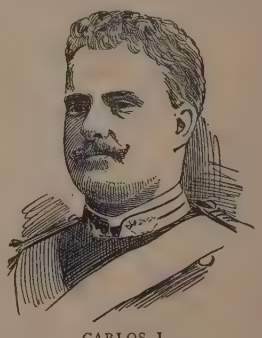
CARLISLE, John Griffin, an American statesman; born in Campbell County, Kentucky, Sept. 5, 1835; taught school in the county, and afterward at Covington; was admitted to the bar in 1858, and was a member of the House of Representatives from 1859 to 1861. He was elected to the state senate in 1866, and re-elected in 1869; he was also a delegate-at-large from Kentucky to the national Democratic convention in 1868. He resigned his seat in the Senate in June, 1871, and was the same year elected lieutenant-governor, serving until September, 1875. The year following he was alternate Presidential elector for the state at large. He was a member of consecutive Congresses from the Forty-fifth to the Fifty-first, both inclusive, and was speaker in the Forty-eighth, Forty-ninth and Fiftieth Congresses. In 1890 he was elected to the United States Senate as a Democrat, to fill the unexpired term of James B. Beck, and in March, 1893, was appointed Secretary of the Treasury by Mr. Cleveland. In 1895–96 he took a firm stand in favor of the gold standard, making numerous speeches in various parts on the country, and was looked upon as one of the leaders of the "sound money" wing of his party.

JOHN G. CARLISLE.

CARLISTS, the name given to the supporters of the Spanish pretender, Don Carlos de Bourbon. See Spain, Vol. XXII, pp. 345, 346.

CARLOMAN, the name of two Frankish dukes. See France, Vol. IX, p. 531.

CARLOS I, king of Portugal, son of King Louis I, was born Sept. 28, 1863; married Marie Amélie, daughter of the Comte de Paris, May 22, 1886, and succeeded his father on the throne, Oct. 19, 1889.



CARLOS I.

CARLOS, Duke of Madrid, born March 30, 1848. He claims the Spanish throne as the son of Don Juan, the brother of Carlos (Charles VI), who claimed the throne, and in whose behalf the uprisings of 1848, 1855 and 1860 took place. As Charles VI died without heir, his claims were taken up by Don Juan, and in turn by the present Carlos. Don Juan married Maria Teresa of Austria. Carlos is married to Margaret of Bourbon, sister of the late Henry V of France, Comte de

Chambord. Carlos styles himself Charles VII, and in 1872, 1873 and 1875–78 his followers raised rebellions in the mountain provinces. They were defeated, and Carlos obliged to flee to France, from which he was driven in 1881 on account of his actions in behalf of the Comte de Chambord. He took refuge in London.

CARLOS, Don, son and heir of Philip II of Spain, the subject of Schiller's tragedy, *Don Carlos;* died miserably in prison, his father being suspected of causing his death. See Philip II, Vol. XVIII, p. 744, 745.

CARLOTTA, ex-empress of Mexico, daughter of Leopold I, first king of the Belgians, was born June 7, 1840. In 1857 she married the Archduke Maximilian of Austria, who became emperor, in 1863, of that part of Mexico which was occupied by French troops, and was shot at Queretaro, June 19, 1867. Carlotta, in 1866, returned to Europe, and sought aid in vain to uphold her husband's fortunes in Mexico, but in Rome her mind gave way under stress of grief and anxiety, and she was secluded in Brussels.

CARLOVINGIAN or CAROLINGIAN DYNASTY. See France, Vol. IX, pp. 531–536.

CARLSEN, Emil, artist; born in Denmark in 1848; moved to the United States in 1872; since 1887 has lived in New York, with the exception of a short time spent in San Franciso. He is known on account of his landscapes, but better by reason of his work in still life.

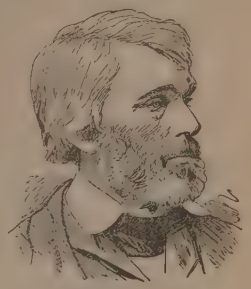
CARLTON, Thomas, Methodist clergyman; born in Londonderry, New Hampshire, July 26, 1808; died in Elizabeth, New Jersey, April 16, 1874. He entered the ministry in 1829, and for 23 years remained in the Genesee Conference, being located in Buffalo, Rochester and elsewhere. In 1852 he became senior agent of the Methodist Book Concern in New York City, and remained in that position until 1872.

CARLUDOVICA, a genus of tropical American palms, belonging to the small family *Cyclanthaceæ*. It differs from the true palms, with pinnate leaves, in having fan-like folded leaves. The flowers are arranged in whorls or close spirals on a thick axis. The leaves of *C. palmata* are used in the manufacture of Panama hats.

CARLYLE, a town and capital of Clinton County, central southern Illinois, on the Kaskaskia River, 47 miles E. of St. Louis, and on the Baltimore and Ohio Southwestern railroad. It contains important manufactories of iron, wagons and plows, and is the seat of a seminary for young women. Population 1890, 1,784.

CARLYLE, Alexander, Scottish Presbyterian ecclesiastic; born Jan. 26, 1722, at Prestonpans, East Lothian (of which parish his father was minister); died at Inveresk, Aug. 25, 1805. He was educated at the universities of Edinburgh, Glasgow and Leyden, and in 1748 was ordained minister of Inveresk. With Robertson, the historian, he led the moderate party in the kirk, and he was sent to London as the accredited agent of his church; was moderator of the General Assembly and dean of the chapel-royal. Carlyle enjoyed the friendship of Hume, Adam Smith, Smollett and John Home. His *Autobiography*, a charming picture of the manners of a bygone age, was published in 1860, edited and completed by John Hill Burton.

CARLYLE, Thomas, a British essayist and historian; born at Ecclefechan, a small market town of Dumfriesshire, Scotland, Dec. 4, 1795; died at Chelsea, London, Feb. 5, 1881. He was the second son of James Carlyle, stonemason, a man of great physical and moral strength, who, though in humble circumstances, was able to give his sons an excellent Scottish education. Thomas received his elementary instruction from his father and mother. His home-teaching was supplemented by attendance at the Ecclefechan school, whence he proceeded, in 1805, to Annan Academy, and in 1809 entered Edinburgh University. Except in geometry, his college curriculum was not remarkable, and even in the mathematical class he took no prize. In 1813 he began a fitful preparation for the ministry, which, however, was soon abandoned.



THOMAS CARLYLE.

In 1814 Carlyle became mathematical master of Annan Academy; in 1816 assistant teacher at Kirkcaldy, and two years later removed to Edinburgh, where he engaged in private teaching. An introduction to Dr. David Brewster led to his writing articles for the *Edinburgh Encyclopædia*, and subsequently to his translating Legendre's *Elements of Geometry*. At the beginning of the session of 1819 he enrolled in the class of Scots law, but he found law as uncongenial a study as divinity. In 1822, while engaged as a private tutor, he arranged to write a *Life of Schiller* for the *London Magazine*, and a translation of the *Wilhelm Meister* of Goethe for an Edinburgh publisher.

In 1824 Carlyle paid his first visit to London, where he remained some months, superintending the publication, in book-form, of his *Life of Schiller*. At this time he made the acquaintance of Coleridge, Thomas Campbell, Cunningham, Procter and other eminent literary men. In the spring of 1825 he removed to a farm near Mainhill, which he had leased, his brother attending to the farming, while he himself translated German romances. His marriage with Jane Baillie Welsh took place in 1826, and they at once settled in Edinburgh. Here Carlyle completed four volumes of translations, which were published under the title of *German Romances*, and became a contributor to the *Edinburgh Review*.

In 1828 the Carlyles removed to Mrs. Carlyle's property of Craigenputtock, and there they lived for about six years. During this period Carlyle subsisted by writing for a number of reviews. He also wrote a *History of German Literature*, the best parts of which were subsequently published in the form of essays, and in 1833–34 there appeared, by installments, in *Fraser's Magazine*, *Sartor Resartus*, his most characteristic work. Carlyle's quiet life at

Craigenputtock was varied by occasional visits to Edinburgh, and by a residence of six months in London, during which time he made the acquaintance of John Stuart Mill and John Sterling.

In 1834 Carlyle resolved to try his fortune in London, and in the summer of that year established himself at No. 5 Cheyne Row, Chelsea, where he lived till the day of his death. Here he settled down to the writing of his *French Revolution*, which appeared in 1837. During the years 1837–40 he lectured to considerable yet select audiences, and his yearly earnings from these lectures maintained him and his wife till the *French Revolution* not only established his reputation as a literary genius of the highest order, but placed him beyond the possibility of want. In 1838 appeared *Sartor Resartus* in book-form, and the first edition of his *Miscellanies*. In 1845 he published *Cromwell's Letters and Speeches*, perhaps the most successful of all his works, inasmuch as it completely revolutionized the public estimate of its subject. In 1851 he published a biography of his friend John Sterling. From this time Carlyle gave himself up entirely to his largest work, the *History of Friedrich the Second, Called Frederick the Great*, the first two volumes of which were published in 1858, and which was concluded in 1865.

In November, 1865, Carlyle was elected lord rector of Edinburgh University, and in the following April the ceremony of his installation took place amid extraordinary demonstrations of enthusiasm. A few days later news reached him, in Dumfries, of the death of Mrs. Carlyle. His grief developed into remorse when he discovered from certain of her letters and her journal that, during a period of their married life, his unconscious want of consideration for her had caused her much misery. It has also been demonstrated by the *Letters and Memorials of Jane Welsh Carlyle* that at one time they were somewhat estranged. These *Memorials* are of note as proving Mrs. Carlyle to have been one of the keenest critics, most brilliant letter-writers and most accomplished women of her time. Carlyle wrote no important work after his wife's death. In 1874 he was offered and accepted the Prussian Order of Merit, in recognition of his having written the life of Frederick the Great, who founded the order. In the same year Disraeli offered him the grand cross of the Bath (with the alternative of a baronetcy) and a pension, but he declined both. He died at his house in Chelsea, Feb. 5, 1881. A burial in Westminster Abbey was offered, but in accordance with his own wish, he was laid in the churchyard of Ecclefechan, beside his kindred.

The growth of a strong character can always be traced to a wonderful degree of accuracy in the utterances or writings of the man. As the thought and manner of thinking change, so does the style, and so does, of course, the disposition of the man himself. Of no one can these foregoing statements be made more truthfully than of Carlyle. What may have been a sweet and generous disposition was so changed by his manner of thought, his dyspeptic way of looking at every subject, that in the later years of his life there was no more crabbed or disagreeable personage than he. His fellows at Annan and Edinburgh first called out an evidence of his disposition, and each successive circumstance emphasized the foundation of that first example. As in speech the crabbed man makes use of short paragraphs, sentences and abrupt endings, so in writing he made use of a style in accord with his nature. Some are inclined to blame his constant study of the German inverted style for his peculiar mannerisms in expression. The German may have had an influence, but the dyspepsia had more. That he could make use of good flowing English is evinced in his *Wilhelm Meister*, but that style was unnatural, and he did not maintain it. His *Sartor Resartus* is a fair example of his natural expression at the time when his life had a little humor in it, but mixed with satire. This work established Carlyle's reputation, for it placed before the public a collection of satirical humor in unique, graphic and rugged style, such as could not but attract attention. The most pessimistic of pessimists, if he puts his ideas into phrases constructed in a manner peculiarly his own, will attract notice and be read ever so widely. So with the *French Revolution*, perhaps his greatest work,—great because the new clothes of old ideas attract. There was less opportunity for display of satire, but a splendid chance for dramatic descriptions. The story of the French struggle is told as the incidents that went to make up the lives of the leaders. Carlyle was careful of the truth as he saw it. In his historical writings he was sure to give the exact circumstance without coloring. This desire to state facts carried him to the extreme in his *Life of Frederick the Great*, in which are given so many details as to make the whole work wearisome. Carlyle was, it must be said, consistent. He preached along the same line in the last year of his life that he did in the early part of his career. He used no delicacy in his method of argument, but pounded and hammered his reading congregation. He was brilliant, powerful, a critic and a genius, but to many so much of his life as was spent in pessimistic sarcasm is a blemish upon his learned industry and life-purpose.

His *Reminiscences* were edited by J. A. Froude (1881); the *Correspondence of Carlyle and Emerson* (1886), by Charles E. Norton, who also edited the *Correspondence of Carlyle and Goethe* (1887); *A Life of Carlyle*, by J. A. Froude, was published in 1882; and the *Letters and Memorials of Jane Welsh Carlyle* in 1883.

CARMAGNOLE, the name of a popular song, dance and jacket. With the Reign of Terror both the song and jacket disappeared. See CARMAGNOLA, Vol. V, p. 114.

CARMAN, ALBERT, a Canadian churchman; born at Matilda (now Iroquois), Ontario, June 27, 1833; was educated at Victoria University, Cobourg, in 1854. In 1858 he was appointed professor of mathematics in Albert College, Belleville, Ontario, becoming president of the institution in 1858, developing it into Albert University. He was also instrumental

in founding Alma College for Girls, at St. Thomas. In 1864 he was ordained an elder in the Methodist Episcopal Church, bishop in 1874, and was chosen general superintendent of the church in Canada; it being by his means that the various sections of that church in Canada became united. He has published a work entitled the *Guiding Eye*.

CARMAN, Bliss, a Canadian poet of the nineteenth century, whose songs, in minor key, have obtained considerable popularity, was born in Fredericton, New Brunswick, April 15, 1861. He was educated at the University of New Brunswick and also studied abroad. Then he read law for a few years, tried engineering, and returned to his studies in philosophy and English at Harvard in 1886. Four years later he became connected with the editorial staff of the New York *Independent*, also assisting in launching the early numbers of the *Chap-Book* and contributing thereto. His first book of verse, *Low Tide on Grand Pré*, was published in 1893, and won unusual recognition from capable critics. There was in it a tender threnody and strain of the woods and waste places, as well as true poesy. His next volume, *Songs From Vagabondia*, written in collaboration with Richard Hovey, was published in 1894, and was as favorably received. In 1895 he issued a *Threnody for Robert Louis Stevenson*, a delicate tribute of poetry to his dead friend.

In October, 1895, was published, in uniformity with a special series, *Behind the Arras: A Book of the Unseen*, in which the author's previous reputation was fully sustained. Indeed, in his particular field, Mr. Carman, by his fresh glimpses of life and nature, reveals the scenes of his native Arcady, linking his verses with memories of Longfellow.

CARMATHIANS or KARMATHITES, a branch of the Ismailian sect of Islam. See Mohammedanism, Vol. XVI, pp. 586–588, 594.

CARMEL, town and capital of Putnam County, southern New York; 49 miles N. of New York City. It is the seat of Drew Seminary for Young Ladies. Population 1890, 2,912.

CARMEN SYLVA, the pseudonym of Pauline Elizabeth Ottilie Louise, queen of Roumania. See Elizabeth, Queen of Roumania in these Supplements.

CARMI, city and capital of White County, southeastern Illinois, situated at the head of navigation on the Little Wabash, about 100 miles N.E. of Cairo, and on the Cleveland, Cincinnati, Chicago and St. Louis, and the Louisville and Nashville railroads. It contains flour mills and manufactories of woolens and iron. Population 1890, 2,785.

CARNAHUBA PALM or CARNAUBA PALM, a very beautiful species of palm (*Copernicia cerifera*), a native of Brazil. It attains a height of from 20 to 40 feet, and its timber is used in Brazil for a great variety of purposes. The fruit is black, and about the size of an olive. It is sweet, and is eaten raw, and also prepared in various ways. Scales of wax cover the under side of the leaves, and drop off when the fallen and withered leaves are shaken. Being collected in this way, the wax is melted into masses, and forms an important article of commerce. See Wax, Vol. XXIV, p. 459.

CARNALLITE, a mineral which, when found in masses, has fertilizing value. See Mineralogy, Vol. XVI, p. 384.

CARNARVON, Henry Howard Molyneux Herbert, Earl of, born in 1831, died Jan. 28, 1890. He was educated at Oxford, and succeeded his father as fourth earl in 1849. He entered the Upper House as a Conservative, and in 1866 accepted from Lord Derby the office of Colonial Secretary, but resigned in 1867. On Disraeli's return to power in 1874, Lord Carnarvon resumed office as Colonial Secretary—once more, however, to resign in January, 1878, in consequence of the dispatch of the British fleet to the Dardanelles. During the brief Conservative administration of 1885–86 he was Lord-Lieutenant of Ireland, and his negotiations with Mr. Parnell gave rise, two years later, to considerable controversy. He was author of *The Druses of Mount Lebanon* (1860); *Reminiscences of Athens and the Morea* (1869); and translations of the *Agamemnon* (1879); and the *Odyssey* (1886).

CARNATION, a plant. See Pink, Vol. XIX, pp. 106, 107; Horticulture, Vol. XII, p. 254.

CARNEGIE, Andrew, an American manufacturer; born in Dunfermline, Scotland, Nov. 25, 1835. His father was a weaver, who, in the hope of bettering his family, came to the United States, where the son found employment at Pittsburg, Pennsylvania, in tending a small stationary engine. Dissatisfied with this, the boy became telegrapher for the Atlantic and Ohio Company. While in the employ of the superintendent of the telegraph lines he met Woodruff, the inventor of the sleeping-car, and seeing the value of the invention, engaged in the enterprise of getting it into use. This venture laid the foundation for his immense fortune. He became superintendent of the Pittsburg division of the Pennsylvania railroad; was at one time a member of an oil syndicate which realized $1,000,000 annually in cash dividends; established, in company with others, a rolling-mill, and in the extension of this last-mentioned enterprise Mr. Carnegie has become the controller of the largest system of iron and steel works in the world. Mr. Carnegie frequently writes on the labor question, and is the author of *An American Four-in-Hand in Britain* (1883); *Round the World* (1884); *Triumphant Democracy; or, Fifty Years' March of the Republic* (1886, 1893); and *The Gospel of Wealth* (1890). Besides carrying on immense business enterprises, Mr. Carnegie has established generous charities. His native country has been remembered in the gift of $250,000 for a free library in Edinburgh, and in the erection (1879) of extensive swimming-baths and the gift of $40,000 to establish a free library for the use of the citizens of Dunfermline. Bellevue Hospital, in New York City, has been endowed with $50,000 for a Carnegie laboratory. Pittsburg, Pennsylvania, has received

ANDREW CARNEGIE.

$500,000 for a free library, while Allegheny City has been given half that amount for a music hall and library. Mr. Carnegie has established free libraries for the use of his employees at several places.

CARNELIAN. See AGATE, Vol. I, p. 277.

CARNIFEX FERRY, BATTLE OF, was fought near the ferry crossing the Gauley River, in Nicholas County, south-central West Virginia, eight miles below Summerville, on the north bank of the river, Sept. 10, 1861. The Confederates, under General Floyd, numbered 5,000 and were strongly intrenched. They were attacked by a superior force of Federals under General Rosecrans. The battle was continued until darkness, when, during the night, General Floyd escaped by the bridge, which he cut behind him, leaving his camp equipment and munitions to fall into the hands of the Federal troops.

CARNOCHAN, JOHN MURRAY, an eminent surgeon; born in Savannah, Georgia, July 4, 1817; died in New York City, Oct. 28, 1887. He studied medicine at the University of Edinburgh and graduated there, and afterward studied surgery in Paris, London and other Continental cities. In 1847 he began the practice of surgery in New York City, where he at once attained a very high reputation on account of his success in operations never before attempted. In 1852 he severed and tied the femoral artery, effecting a cure in an exaggerated case of nutrition (*elephantiasis arabrum*). The same year he removed a lower jaw, entire, with both condyles. In 1854 he removed the entire ulna, and also the entire radius. In 1856 he cut down and removed the entire trunk of the second branch of the fifth pair of cranial nerves, the nerve being cut from the infra-orbital foramen to the foramen rotundum, at the base of the skull, involving an operation through the malar bone. The removal of this nerve had been decided upon to secure relief in a chronic case of neuralgia. It was entirely successful, and made the bold and accurate operator famous throughout the world. In 1851 he was appointed professor of surgery in the New York Medical College. He occupied other professional appointments, including that of surgeon-in-chief to the State Immigrant Hospital. He has published *Congenital Dislocations* (1850); *Contributions to Operative Surgery and Surgical Pathology* (1860, 1877–86).

CARNOT, LAZARE HIPPOLYTE, a son of the celebrated French statesman and mathematician, Lazare Nicolas Marguerite Carnot (q.v., Vol. V, p. 124), and father of the late President of the French Republic (see article following); born at St. Omer in 1801; died in 1888. He was a radical republican of note, and was an early disciple of St. Simon, but left that school to devote himself to the inculcation of a more orthodox and moral socialism. From 1840 to 1848 he was a member of the Chamber of Deputies, and was appointed Minister of Instruction, February of the latter year, but resigned in July. From 1863 until 1868 he was a member of the legislative assembly; he was defeated in 1869 by Gambetta, but in 1871 was again elected; upon the formation of the Senate in 1875 was elected a life member. He published a work exposing St. Simonianism, and also wrote biographies of his father and of Henri Gregoire and of Barrère. He died in Paris, March 16, 1888.

CARNOT, MARIE FRANÇOIS SADI, late President of the French Republic, was born at Limoges, Aug. 11, 1837. He was the son of Lazare Carnot and a grandson of L. N. M. Carnot, "the organizer of victory" under the French Convention, and a civil engineer by profession. When only 20 years of age he entered as a student the École Polytechnique, and passed with distinction to a school for special instruction in the building of roads and bridges. During the siege of Paris he was appointed Prefect of the Seine Inférieure, and as Commissary-General gave valuable assistance in organizing the defenses of that department. A month later he took his seat in the National Assembly as deputy for Côte-d'Or, ranging himself in line with the Republican Left. He afterward sat for Beaune. In 1886 he took office in the Brisson Cabinet as Finance Minister, the duties of which he also filled when M. de Freycinet formed his government in January, 1887. On the resignation of M. Grévy in 1887, M. Carnot was elected President of the republic. The Czar of Russia conferred on him the Order of St. Andrew in March, 1891. During the Franco-Russian *fêtes* of 1893 he took a prominent part both at Paris and at Toulon, and in consequence of these it was said that he had determined to stand again for the Presidency. His promising career was cut short by the dagger of an assassin (an Italian anarchist named Santo) during a *fête* given in his honor at Lyons, June 24, 1894. He was a sagacious and high-minded statesman, and his death was universally regretted.

M. FRANÇOIS SADI CARNOT.

CARO, village and capital of Tuscola County, in the west-central part of southern Michigan, on the Michigan Central railroad, 34 miles E.S.E. of Bay City, in a district of stock and produce farms. It has several lumber-mills; is supplied with electric lights and water-works. In 1894 the population was 1,780.

CARO, ELME MARIE, a French philosopher; born at Poitiers, March 4, 1826. He was appointed lecturer in the École Normale de Paris in 1857; professor at the Sorbonne in 1867, and member of the French Academy in 1876. His lectures at the Sorbonne became very attractive to ladies, and he was known as "The Ladies' Philosopher." He was a follower of Cousin, and attacked the view of Schopenhauer and Hartman. He was a contributor to the *Revue des Deux Mondes* and to the *Journal des Savants*. His works include *L'Idée de Dieu et ses Nouveaux Critiques* (1883); *La Philosophie de Goethe* (1880); *Le Matérialisme et la Science* (1883); *Études Morales sur le Temps Présent* (1879); *Mélanges et Portraits* (1888). He died at Paris, July 13, 1887.

CAROB. See LOCUST TREE, Vol. XIV, p. 767.

CAROLINE BOOKS, four books drawn up at the instance of Charlemagne against the decrees of the second council of Nicæa, A.D. 787, in regard to the worship of images. This synod had declared in favor of images, and the Pope, Adrian I, who had taken part, agreeing with its decrees, communicated them to the Frankish king, Charlemagne. The latter was displeased with the findings of the synod, or with the Pope, and forwarded the communication to Offa, king of Mercia, England, who laid it before his bishops. Alcuin, the head of Charlemagne's school of the palace, an Englishman, was on a visit to York, his native place, and he added some comments to the document, which he presented to the French king, in the name of the English princes and bishops. This gave origin to the books named, which contain the judgments of the bishops of the West on the questions raised by the synod. The work consists of four books of 120 chapters, criticising the synod and its decisions, and it laid down the principle of leaving Christian art free in the representation of its ideas, but excluding the superstitious misuse thereof. The Pope received the books with placidity, and the synods of Frankfort (794) and Paris (825) accepted them as authority. They were printed for the first time at Paris in 1549 by Jean du Tillet.

CAROLUS DURAN, painter. See DURAN, in these Supplements.

CARON, SIR JOSEPH PHILIPPE RÉNÉ ADOLPHE, a Canadian statesman; born at Quebec in 1843; graduated at McGill University in 1865; practiced law and became a queen's counsel in 1879. He entered the Dominion Parliament as a Conservative in 1873; became Minister of Militia in 1880 and Postmaster-General in 1893. He was knighted (K.C.M.G.) in 1885 for his part in suppressing the rebellion in the northwest.

CAROTID ARTERY. See ANATOMY, Vol. I, p. 904.

CARP, a fish of the *Cyprinidæ* family. See ANGLING, Vol. II, p. 43; ICHTHYOLOGY, Vol. XII, p. 692; PISCICULTURE, Vol. XIX, p. 127.

CARPACCIO, VITTORE, a painter of the early Venetian school; born in Istria about 1450. He was a pupil of Vivarini, the elder, and also of Gentile Bellini. In 1490–95 he painted nine subjects from the life of St. Ursula, which are now preserved in the Accademia of Venice. About 1494 he executed another work now in the same collection, *The Patriarch of Grado Casting Out a Devil*, which possesses much antiquarian interest, from its accurately detailed view of the Rialto. His next great series of works was the nine subjects from the lives of the Saviour and Sts. Jerome, George and Tryphonius (1502–08), painted for the school of San Giorgio de Schiavoni, still preserved there, and made still more famous by Ruskin. In 1510 he executed the *Presentation in the Temple*, now in the Accademia, which is usually regarded as his masterpiece. His latest dated works, at Pirano and Pozzale, are inscribed 1519, and he is believed to have died about 1522.

CARPEAUX, JEAN BAPTISTE, a French sculptor; born at Valenciennes, May 11, 1827; studied at the École d'Architecture of his native place, and afterward at Paris, where he remained until 1844. In 1853 his *bas-relief*, the *Submission of Abd-el-Kadir*, secured for him the regard of Napoleon III. He gained the Prix de Rome in 1854 with *Hector and Astyanax*, and in 1859 he exhibited his *Young Fisher*, in bronze, which was notably unconventional. His group, *Ugolino* and his *Children* (1873), in bronze, was purchased by the government and placed in the garden of the Tuileries. In 1865 he executed *Imperial France Bringing Light to the World and Protecting Agriculture and Science*, which was made for one of the pediments of the Flora Pavilion of the Tuileries. In 1869 his group of *Dancers* was placed on the façade of the New Opera at Paris, and excited immense interest. In 1872 he finished the plaster model for his group, *The Four Quarters of the World Supporting the Globe*, which was meant for the fountain of the observatory at the Luxembourg. The group consists of four women, a European, an African, a Chinese and a Peruvian, holding up a globe on which the signs of the zodiac are carved in *bas-relief*. This was the artist's last work. After wintering at Nice he returned to Paris to die, regretting his unfinished career. Many of his works are owned by private individuals. He was a chevalier of the Legion of Honor, and died near Asinières, Oct. 11, 1875.

CARPEL, in botany a simple pistil or one of the several parts of a compound pistil. See BOTANY, Vol. IV, p. 141.

CARPENTARIA, a large, deep, rectangular gulf, indenting the northeastern coast of Australia. Its mouth, extending from Cape Arnhem to Cape York, is 340 miles wide, and its length is about 450 miles. It has numerous islands. Its shores are generally low, except on the western coast. It was named in honor of Peter Carpenter, governor-general of the Dutch East Indies in 1623.

CARPENTER, CHARLES C., rear-admiral of the United States navy; born at Greenfield, Massachusetts, Feb. 27, 1834; entered the navy as a midshipman, Oct. 1, 1850; became lieutenant-commander, July 16, 1862. He was attached to the ironclad *Catskill* as executive officer, and took part in attacks upon Charleston harbor in April and June, 1863. He became commander in 1869; captain in 1880; commodore in 1893; rear-admiral, Nov. 11, 1894; and was retired Feb. 27, 1896.

CARPENTER, FRANCIS BICKNELL, an American painter; born at Homer, New York, Aug. 6, 1830. He was in the studio of Sandford Thayer, Syracuse, New York, for six months in 1844. He settled in New York City in 1851, and the next year he was elected an associate of the National Academy. He has painted portraits of most of the famous men of contemporary times, among them being those of Presidents Lincoln, Fillmore, Tyler and Pierce; and, among others, of Greeley, Henry Ward Beecher, George William Curtis, James Russell Lowell, William H. Seward, Charles Sumner, John C. Frémont and Emma Abbott. His greatest work was his *Emancipation Proclamation*, finished in 1864, which is now in the Capitol, having been purchased by Miss Thompson for $25,000 and presented to Congress in 1877, after its exhibition throughout the

chief places in the Northern states. It has been engraved. Mr. Carpenter published a book entitled *Six Months in the White House with Abraham Lincoln.*

CARPENTER, Joseph Estlin, an English Unitarian theologian; born at Ripley, Surrey, Oct. 5, 1844; educated at University College, London, and became vice-principal and professor of ecclesiastical history in Manchester New College, Oxford. He is editor and translator of volumes 3–5 of G. H. A. von Ewald's *History of Israel* (1871–74), of Prof. C. P. Tiele's *Outlines of the History of Religions* (1877, 1884), and, with Prof. T. W. Rhys Davids, of volume 1 of the *Sumairgala Vitasini* (1886), and volume 1 of the *Digha Nikàya* (1889), which exhibit his Sanskrit scholarship. He is the author of *Three Ways of Salvation* (1884) and *The Three First Gospels* (1890). He is the nephew of Mary Carpenter (q.v., in these Supplements), and wrote her biography.

CARPENTER, Lant, an English theologian; born at Kidderminster, Sept. 2, 1780; was educated at Glasgow; became Unitarian pastor at Exeter in 1805, and removed to Bristol in 1817. He was the father of Mary Carpenter and of William Benjamin Carpenter, the scientist (q.v., in these Supplements). Among his numerous works are *Introduction to the Geography of the New Testament* (1805); *Unitarianism the Doctrine of the Gospel* (1809); *Harmony; or, Synoptical Arrangement of the Gospels* (1835); *Sermons on Practical Subjects* (1840). He was drowned, probably washed overboard, in a passage from Naples to Leghorn, April 5, 1840.

CARPENTER, Louis G., an irrigation engineer; born at Orion, Michigan, March 26, 1861. He studied at the Michigan Agricultural College, and became assistant professor of mathematics and engineering there; afterward professor of engineering at the Colorado Agricultural College, and also meteorologist and irrigation engineer at the State Agricultural Experiment Station, in 1888. In the latter position he originated the first course of irrigation engineering given in an American college, and founded the American Society of Irrigation Engineers (1891).

CARPENTER, Mary, a English philanthropist; born at Exeter, April 3, 1807; died June 14, 1877. She was the daughter of Dr. Lant Carpenter and aunt of Joseph Estlin Carpenter (q.v., in these Supplements). Trained as a teacher, she took an active part in the movement for the reformation of neglected children, and besides advocating their cause in her writings, she founded a ragged school at Bristol in 1846, and several reformatories, one of which, the Red Lodge Reformatory, she superintended. She promoted the Industrial Schools Act of 1857, and some of her proposals were adopted in the amended acts of 1861 and 1866. In the prosecution of her philanthropic labors she visited India four times, had an interview with the Queen in 1868 in connection with her work, and in 1870 instituted the National Indian Association, whose journal she edited. She attended at Darmstadt a congress on women's work, as a guest of the Princess Alice, and visited America in 1873. Her plan of day-feeding industrial schools in connection with school boards was adopted in 1876. Besides her reformatory writings she published *Ragged Schools* (1849); *What Shall We Do with Our Pauper Children?* (1861); *Our Convicts* (1864); *The Last Days in England of the Rajah Rammohun Roy* (1866); *Six Months in India* (1868); etc.

CARPENTER, Matthew Hale, an American Senator; born in Moretown, Vermont, Dec. 22, 1824; died in Washington, District of Columbia, Feb. 24, 1881. He studied military science at West Point, and from there he went to Vermont and read law. Mr. Carpenter was in the office of Rufus Choate in 1847, but the following year he removed to Beloit, Wisconsin. He was engaged in the *quo warranto* proceedings against Governor William A. Barstow of Wisconsin, and was successful in vindicating the government reconstruction acts of 1867, in the McCardle case of 1868. From 1869 to 1881 he served in the United States Senate with the exception of one term. He was a war Democrat, advocated emancipation and enfranchisement, and favored government control of railroads.

CARPENTER, Philip Pearsall, an English naturalist; born in Bristol, Nov. 4, 1819; died in Montreal, Canada, May 24, 1877. Educated in Edinburgh University and the Manchester New College, he became a Unitarian minister and held several pastorates, becoming widely known for his benevolence. For years he studied conchology and became an authority on the subject. He catalogued the Mazatlan shells of the British Museum and arranged collections of shells for the Smithsonian and other American institutions. He presented valuable collections of shells to the British Museum and to McGill University.

CARPENTER, William Benjamin, an English physiologist, son of Dr. Lant Carpenter (q.v.); born at Exeter, Oct. 29, 1813; died Nov. 19, 1885. He was educated at Bristol, passed some time in the West Indies, and afterward studied medicine at Bristol, London, and Edinburgh. His graduation thesis (1839) on the nervous system of invertebrate animals prepared the way for his *Principles of General and Comparative Physiology*, one of the earliest works giving a general view of the science of life. Removing to London in 1844, he was appointed Fullerian professor of physiology at the Royal Institution, professor of medical jurisprudence at University College (1849), examiner at the University of London, and its registrar (1856). He edited (1847–52) the *British and Foreign Medico-Chirurgical Review* and a *Popular Cyclopædia of Science.* In 1872 he was president of the British Association for the Advancement of Science. In 1879 he received the distinction of C.B. While vice-president of the Royal Society he secured government aid in the investigations in marine zoölogy.

Carpenter and his colleagues made three voyages to the North Atlantic and Mediterranean. He made valuable researches on the *Foraminifera*, on the *Eozoön Canadense*, and on feather-stars and crinoids. His deep-sea explorations led him to advocate the doctrine of vertical ocean circulation sustained by opposition of temperature only, independent of and

distinct from the horizontal currents produced by winds. (See ATLANTIC, Vol. III, pp. 22–24.)

Though it may be true that Carpenter made no startling scientific discovery, he must be awarded the foremost place as a systematizer of the scientific knowledge of his time, placing it in a digestible form in the hands of the student. He showed his early capacity by publishing, previous to 1839, a work *On the Unity of Function in Organized Beings*. In 1849 he secured a prize of a hundred guineas for an *Essay upon Alcoholic Liquors*. Among his other works are *General and Comparative Physiology* (1839), the portion *Comparative Physiology* being published separately in 1854; *Zoölogy and Instincts of Animals* (1848, 1854); *Human Physiology* (7th ed. 1869); *Introduction to the Study of Foraminifera* (1862); *The Microscope and Its Revelations* (5th ed. 1875); *Physiology of Temperance* (1870); *Mesmerism and Spiritualism* (1877); *Nature and Man* (1888). He contributed to this ENCYCLOPÆDIA the articles on FORAMINIFERA; MICROSCOPE; etc.

CARPENTER, WILLIAM BOYD, an English churchman; born at Liverpool, March 26, 1841; educated at St. Catherine's College, Cambridge, graduating there, senior optime, 1864, in which year he was ordained. He became canon of Windsor in 1879; lecturer and select preacher in Cambridge and Oxford universities, and in 1884 was consecrated bishop of Ripon. He was honored with the degree of D.C.L. by Oxford in 1889, and was appointed honorary chaplain to the Queen in 1878. Some of his works are *Thoughts on Prayer* (1872); *The Prophets of Christendom* (1876); *Narcissus: A Tale of Early Christian Times* (1879); *The Witness of the Heart to Christ*, the Hulsean lecture at Cambridge for 1878 (1880); *My Bible* (1884); *The Permanent Elements of Religion*, the Bampton lectures at Oxford for 1887 (1889).

CARPENTER, WILLIAM HENRY, an American philologist; born at Utica, New York, July 15, 1853; graduated at Cornell University in 1878; studied at Leipsic and Freiburg, in Baden; returning home after several minor appointments, became adjunct professor of Germanic language and literature in 1890 at Columbia College. He published, at Leipsic, *Grundriss der Neuislandischen Grammatik* (1881), and a translation, *The Slojd in the Service of the School*, by Otto Salomon (New York, 1888).

CARPENTER–BEE, a hymenopterous insect of the genus *Xylocopa*, and the bee family (*Apiariæ*), resembling the ordinary bumble-bees. They bore long tunnels in solid wood, which are subdivided into cells by partitions formed of particles of sawdust glued together. These cells are provisioned with pollen, and an egg deposited in each. These bees are the largest known, and occur in both Old and New Worlds.

CARPENTRY. The trade of the carpenter has been largely changed within a score of years, by the introduction of labor-saving machinery for the manufacture of standard parts of buildings, which once were fitted by hand by the workman, and put up as made. Frame houses and the woodwork of other buildings are now manufactured at the planing-mills, sash and blind factories, etc. The builder buys all his doors, door-frames, window-frames, sashes, moldings, mantels, cornices, stair-rails, newel-posts, and the thousand and one accessories of a modern dwelling, and the carpenter simply puts them together, with the parts that have all been sawed to size at the mill. In short, the carpenter, as the public sees him, has become simply a fitter up of the parts of houses as designed by an architect, and made from his specification at the mills.

A very long list of wood-working machines are manufactured to do this work for the carpenter. There are almost numberless varieties of sawing-machines, planers and matchers, molding-machines that will give a board almost any pattern of molding, both double and single surfacers, sash-sticking machines, tenoning-machines, resawing-machines, miter-cutting machines, tongueing and grooving machines, dovetailing-machines, sanders, boring and mortising machines, together with various combinations and modifications of all of these.

The metal-worker has intruded on the field of the carpenter, and reduced the share of work that formerly fell to him. Steel ceilings are becoming common in large and handsome buildings, and the sheet steel is stamped into beautiful designs, which can hardly be matched in any other material. Metal lath is also increasing in use, its insertion being required by law in some classes of buildings, in some large cities. It consists of sheet steel, about as thick as a good grade of stovepipe, and is corrugated and slit by running through a creasing and cutting machine. Iron and steel shutters are common in fire-proof buildings, and iron doors are sometimes introduced at points where they would serve to cut off a fire. Metal shingles and various other forms of metal roofing meet with increased favor, and galvanized iron cornices, ridging, gutters, trimmings, etc., have usurped the market. Building-papers for making outer walls more impervious to the wind, and mineral wool and asbestos for deadening sounds and fire-proofing are among the other common articles which supplement the woodwork in most modern dwellings. The small hardware used by carpenters in building construction has been generally improved in appearance and cheapened in price.

Another innovation of metal in frame buildings is the introduction of malleable iron brackets as joist-hangers and wall-hangers, for supporting the ends of joists and doing away with the old method of framing by mortising and tenoning.

The more ornamental designs of frame buildings which now prevail have called for increased skill on the part of both architect and carpenter in matters of roof-framing, balcony-construction, and arrangement of framing to meet peculiarity of design. Otherwise the trade of carpentry has been simplified by modern improvements. See BUILDING, Vol. IV, pp. 476–485. CHARLES H. COCHRANE.

CARPET–BUG. See ANTHRENUS SCHROPHULARIÆ, in these Supplements.

CARPINO, a town of Italy, on the promontory of Gorgano, in Apulia, 22 miles N.E. of San Severo. Population 1891, 6,216.

CARPIO, MANUEL, a Mexican poet; born in Vera Cruz, May 1, 1791; died Feb. 11, 1860. He

was educated for a physician; graduated in 1832; became professor of physiology and hygiene at the University of Mexico in 1833, and held many positions connected with state hygiene. He was in Congress as a deputy in 1824, 1846 and 1848; Senator in 1851, and member of the state council, 1858. Carpio was devoted to classical and archæological studies, making early Israelitish subjects his favorites. He is best known abroad by his poems, the first of which he did not publish until he was past forty years of age. A collected edition appeared in 1849.

CARPOPHYTES, a name applied by some botanists to those Algæ and Fungi in which a *spore-case* is developed. This spore-case primarily results directly from the act of fertilization, called carpogamy, although in many fungi in which the so-called "spore-case" appears the power of sexual reproduction seems to have been lost. Those who use such a classification include under the name the highest of the Algæ and Fungi.

CARPUS, bones of the wrist. See SKELETON, Vol. XXII, pp. 117, 118.

CARQUINEZ OR KARQUENAS STRAIT. A strait 20 miles N.N.E. of San Francisco, connecting Suisun Bay with San Pablo Bay, and separating the counties of Solano and Contra Costa. It is eight miles long, from one to two wide, and is navigable. It conveys the waters of all the rivers of the Sierra Nevada to the sea.

CARR, EUGENE A., an American soldier; born in Erie County, New York, March 20, 1830. In 1850 he graduated at the United States Military Academy, and up to 1861 was engaged in expeditions against the Western Indians. During the Civil War he served under Hunter, Halleck and Curtis, fighting in Arkansas, Missouri, Mississippi, and being present at the battles of Wilson's Creek, Pea Ridge, Vicksburg, Port Gibson, Champion Hill, Edwards's Station, Black River Bridge, Little Rock, Clarendon and Camden. At the close of the war he was brevetted major-general of the United States army, and in 1892 was promoted to the active rank of brigadier-general, being the sixth of that rank on the list. He was retired in 1893.

CARR, JOSEPH B., an American soldier; born in Albany, New York, Aug. 16, 1828. In 1849 he entered the militia, and on the outbreak of the Civil War his regiment was the first to encamp in the state of Virginia. In 1862 he was made brigadier-general of volunteers. He was present at the battles of Malvern Hill, Fredericksburg, Chancellorsville and Gettysburg, and during the latter part of the war served on the defenses of the James River. For meritorious service he was promoted to the rank of major-general. He was mustered out of service at the close of the war, and became a manufacturer of chain cable. He was secretary of state in New York in 1881 and 1883, and was the Republican candidate for lieutenant-governor in 1885.

CARR, JOSEPH WILLIAM COMYNS, an English art critic and dramatist; born 1849; studied law at the Inner Temple, was called to the bar in 1872, and joined the northern circuit, but soon forsook the legal profession to take up that of literature. He became a frequent contributor to the reviews, his favorite subject being art. He was art critic for the *Pall Mall Gazette*, and English editor for *L'Art*. He assisted in establishing the Grosvenor Gallery, and was one of its directors. His published works on art include *Drawings by the Old Masters* (1877); *The Abbey Church of St. Albans* (1878); *Examples of Contemporary Art* (1878); *Art in Provincial France* (1883); and *Papers on Art* (1884). He is perhaps better known as a playwright, dramatizing Hardy's *Far from the Madding Crowd;* collaborating with Hugh Conway in *Called Back;* and writing *Arthur*, produced at the Lyceum Theater in 1895.

CARR, SIR ROBERT, born in Northumberland, England; was one of the royal commissioners of New England appointed by Charles II in 1664. The colonists resisted, but at New Amsterdam the Dutch settlers were defeated by the British fleet. The commissioners renamed the town, calling it New York, in honor of the Duke of York. Fort Orange received the name of Albany. The Swedes and Dutch along the Delaware River acknowledged the English authority, but there was some trouble at Boston. In Casco, Maine, the inhabitants acknowledged the authority of the commission. Sir Robert returned to England, and died, June 1, 1667, the day after his arrival.

CARRAGEEN. See IRISH MOSS, Vol. XIII, p. 276.

CARRATRACA SPRINGS, a village in Plantagenet township, Prescott County, northeastern Ontario, on the Ottawa River, 45 miles E. of Ottawa. It has copious mineral springs of some repute for their alterative properties. Population of Plantagenet township in 1891, 7,325.

CARRERA, JOSÉ MIGUEL, a Chilean soldier; born in Santiago de Chile, July 19, 1782; died in Mendoza, Argentine Republic, Sept. 1, 1815. He was educated in Madrid, fought the French, and arriving in Chile at the time of the revolution, became sufficiently popular with the chiefs to depose Rosas and to assume the government. He was proclaimed dictator and general, July 19, 1812. He managed to keep control of the government till Nov. 27, 1813, when he was deposed. The following year he raised a rebellion, but the Spaniards routed him, and he fled to Mendoza. In 1815 he fell into the hands of his enemies and was executed.

CARRERA, RAFAEL, President of Guatemala; born in the city of Guatemala in 1814; died there, April 14, 1865. He was of Indian and negro descent, and began life as a drummer-boy and herder in 1829. When Guatemala revolted in 1839, Carrera commanded 6,000 Indian mountaineers in the war which followed. He obtained favor with the aristocratic and clerical party, was able to reinstate as ruler Rivera Paz, and soon became commander-in-chief of the army. Morazán, who had been President, was forced to abandon Guatemala with the army which had supported him, and Carrera became President on March 21, 1847. He ruled for a year, then resigned and went to Mexico. Wars called him home, and after defeating the enemies of Guatemala, he was re-elected President in October, 1851. In 1854 he was chosen President for life. Carrera

opposed the plan for a confederation of the Central American states. He was illiterate, antagonistic to progress, and administered the government with severity.

CARRIAGE, AUTOMOBILE. See AUTOMOBILE VEHICLES, in these Supplements.

CARRICAL, a French settlement in Tanjore, presidency of Madras. See KARIKAL, Vol. XIV, p. 5.

CARRICKMACROSS, a town in Monaghan County, east-central Ireland, 12 miles W. of Dundalk, on the Great Northern railroad. The ruins of a castle built by the Earl of Essex are here. It is noted for its great fairs, held five times a year. Population, 7,000.

CARRICK-ON-SHANNON, the capital of the County Leitrim, western Connaught, Ireland, on the Shannon; 98 miles N.W. of Dublin by the Midland Great Western railroad. It is advantageously situated for trading by rail, river and the Ulster canal. Population 1891, 1,384.

CARRICK'S FORD, a place in Tucker County, central-western West Virginia, on the Cheat River, where the Confederates under General Garnett were routed from their position by General Grant's forces. The engagement took place on July 13, 1861. General Garnett was killed.

CARRIER, AUGUSTUS STILES, an American Orientalist; born at Ripley, New York, Dec. 30, 1857; graduated from Yale in 1879, and after taking the course in theology at Andover and Hartford seminaries, became Presbyterian pastor of Bloomington, Indiana, in 1884, remaining there a year; in 1887 was appointed instructor, and professor in 1892, of Hebrew and cognate languages in McCormick Theological Seminary, Chicago. He is author of *The Hebrew Verb: A Series of Tabular Studies* (1891).

CARRIER, COMMON, one who, for hire, undertakes the conveyance of goods or passengers. There is an important distinction between a *common carrier* and a *private carrier*. A common carrier is bound by law to serve the public generally without favoritism or discrimination, and is held responsible for the safe delivery of all property delivered to his care. Railway companies, steamboat lines, express companies and other carriers have endeavored to escape or limit this liability by incorporating in the bill of lading a contract to the effect that in case of loss or damage to property in transit the carrier should not be liable beyond a certain sum. But the American courts have held that, in so far as this provision seeks to avoid liability for injury resulting from the negligence of the carrier or its employees, it is against public policy, and therefore void. It seems, therefore, well settled that in case of damage occasioned by negligence the carrier must respond for all losses sustained. On the other hand, the law exempts the carrier from liability for injury occasioned by the "act of God," or by such agencies as human foresight and prudence cannot successfully guard against. Deception or misrepresentations by the owner of the goods, as undervaluation, etc., will also avoid or limit the carrier's liability. Common carriers cannot legally give undue and unjust preferences nor make unequal or extravagant charges. All applying have an equal right to be transported, or have their freight transported, in the order of their application, and at the same rate as is given to others under similar circumstances. Questions of preference have been decided upon common-law principles in this country until the passage of what is known as the Interstate Commerce Act by Congress in 1877. That act makes it unlawful for any common carrier to charge an unreasonable rate for its services, to discriminate in favor of one person or locality, to make a greater charge for a short than for a longer distance over the same line, or to enter into any pooling contract with any other common carrier or divide earnings with such carrier. The act also provides for an interstate commerce commission, whose duty it is to investigate all complaints against common carriers for violation of any of the provisions of the act, and require satisfaction for such violation; and in case such satisfaction is not granted within a limited time, to institute proceedings against the offending company. It is also made the duty of all railroad companies to furnish reports to this commission, at stated periods, as to their rate of charges established. The act also provides that a schedule of rates shall be kept in each depot or office of the company for public inspection, and that such rate shall not be increased except upon ten days' public notice, stating the time such change will go into effect, and shall not be decreased except upon three days' notice. This act applies only to such carriers as operate in more than one state, and therefore are subject to regulation by Congress under its power to regulate interstate commerce. The act has been several times amended since its passage, and has had quite a wholesome effect in avoiding, to some extent, the unjust discriminations which common carriers are inclined to make. See also CARRIER, Vol. V, pp. 138, 139.

CARRIER-PIGEON, properly, is the name of a show variety of the pigeon, which has the cere at the base of the bill very large and carunculated, and the eyes surrounded by a wide circle of bare skin (see DOVE, Vol. VII, p. 379). The carrier, as thus understood, is not a member of the homing family. Whether this carrier variety, as now bred for show purposes, represented ancestrally the bird that carried messages mentioned by the ancient writers, is doubtful. Such a pigeon was, however, mentioned by Anacreon, the Greek lyric poet; and Pliny, the Roman naturalist, refers to the communication kept up by Hirtius and Decimus Brutus at the siege of Mutina (the modern Modena) by such means. An instance is further recorded of their employment during the crusade of St. Louis. They have no doubt been employed occasionally in various countries since. But it is to Belgium that we are indebted for the modern development of the real homing-pigeon. In that country the sport of pigeon-flying or racing is a national pastime, and is engaged in by all classes, just as hawking was in a former age by the nobility of all countries. That this variety has an adaptability for homing, the facts prove, but that it is an "instinct," therefore hereditary, is disputed. (See INSTINCT, Vol. XIII, p. 159.) The adaptability seems really to be a matter of training, therefore a truly "acquired faculty." Birds intended for this

purpose must be brought from the place to which it is intended that they should return, and this must be within a short period, not exceeding two weeks from the time of their liberation. The best results of homing have been achieved, too, when the birds had young in their nests; the remarkable fecundity of the species co-operating for its employment in this way. The birds are also kept in the dark and without food for eight hours at least before being sent upon their journey. These pigeons have been known to fly a mile in 90 seconds and 30 miles in an hour, and to have returned home from distances of from 200 to 500 miles, and, though very rarely, from 1,000 miles. For practical purposes this means of communication has been more employed in the East than anywhere else. In the East it is the custom to bathe the feet of the birds with vinegar, to keep them cool, so that they may not be induced to alight in quest of water, which might destroy the message. During the siege of Paris carrier-pigeons were frequently used to convey messages, the microscopic message being wound into a goose-quill and tied to a wing feather.

CARRIÈRE, Eugène, a French painter; born at Gournay-sur-Marne, Seine-et-Oise, Jan. 17, 1849. After studying in the provinces he went to Paris and entered the School of Fine Arts, becoming a student of Cabanel, and made his *début* at the Salon in 1870 with a *Portrait de Femme;* and afterward exhibited *Portrait de Mlle. Stern* (1877); *Jeune Mère* (1879); *La Nymphe Echo* (1880); *Le Baiser de l'Innocence* (1882); *Deux Amis* and *Marguerite* (1884); *L'Enfant Malade* (1885); *Femme à sa Toilette* (1888); *Intimité* (1889); and at the exhibition on the Champs de Mars, in 1890, *Sommeil, Tendresse* and *Le Déjeuner*, etc. He was one of the decorators of the Hotel de Ville, obtained several medals from the Salon, and was decorated with the Legion of Honor in 1889.

CARRIERE, Moritz, German philosophical writer; born at Griedel, in Hesse, March 5, 1817; studied at Giessen, Göttingen and Berlin, and in 1853 became professor of philosophy at Munich. He was one of the founders of the modern school of thought, which endeavors to reconcile deism and pantheism. His important work, *Die Kunst im Zusammenhang der Kulturentwicklung und die Ideale der Menschheit* (5 vols., 1863–74), was so popular that a third edition was commenced in 1876. He also published *Die Sittliche Weltordnung* (1877), a thoughtful monograph on Cromwell, and works on æsthetics, poetry and art. He commenced the publication of a series comprising his complete works in 1886. Died in Munich, Jan. 19, 1895.

CARRINGTON, Edward, a Revolutionary soldier; born in Charlotte County, Virginia, Feb. 11, 1749, and was commissioned lieutenant-colonel of artillery, Nov. 30, 1776. While detached with a portion of his regiment he was made a prisoner at Charleston; afterward served under Generals Gates and Greene, becoming the quartermaster-general of the latter. At the battles of Hobkirk Hill, April 24, 1781, and at Yorktown he commanded the artillery and rendered excellent service. In 1785 he was a delegate to the Continental Congress from Virginia, and in 1807 was foreman of the jury in the trial of Burr for treason. He died at Richmond, Virginia, Oct. 28, 1810.

CARRINGTON, Henry Beebe, an American soldier; born in Wallingford, Connecticut, March 2, 1824. In 1845 he graduated from Yale, and for the three following years taught in Irving Institute, New York, then studied law at New Haven and again engaged in teaching, being an instructor in the Ladies' Collegiate Institute of New Haven. He removed to Columbus, Ohio, practiced law, engaged in the antislavery movement, and helped to organize the state militia. When President Lincoln issued the first call for troops, Carrington, who was adjutant-general of the state, placed nine regiments of militia in western Virginia. During the war he was for most of the time engaged in raising and drilling troops, and he was promoted brigadier-general of volunteers. He was mustered out of this service in 1865, and until 1870 served on military expeditions in Nebraska, Montana and Colorado, and became instructor of military science in Wabash College. The rest of his life has been given to literary pursuits. Among his publications are *Russia as a Nation; American Classics; or, Incidents of Revolutionary Suffering* (1849); *Ab-sa-ra-ka; or, Land of Massacre*, relating the adventures of his life on the plains (1868); *Crisis Thoughts* (1878); and *Battle Maps and Charts of the American Revolution* (1881).

CARRINGTON, Paul, an American statesman; born in Charlotte County, Virginia, Feb. 24, 1733; brother of Edward Carrington. He graduated at William and Mary College; studied law; began practice when only 21, and was soon prominent in public affairs, being a member of the house of burgesses for ten years from 1765. He voted against the stamp-act resolutions of Patrick Henry; was a member of the house of delegates, passing from that to the bench of the general court in 1779, and from that, ten years later, to the court of appeals, where he remained until 1811. In the Virginia convention he voted for the adoption of the constitution. He died June 22, 1818.

CARRION–CROW or BLACK VULTURE (*Cathartes atratus*), a bird of the crow family (*Corvidæ*), abundant in the Gulf states, Central and South America. They are useful as scavengers. See Crow, Vol. VI, p. 618.

CARRION–FLOWER, a name which has been given to the flowers of various species on account of their odor, which resembles that of putrid meat, an odor which attracts certain insects, such as flies, and thus secures cross-pollination. The carrion odor is usually accompanied by livid colors. Notable among the carrion-flowers are the species of *Stapelia* of the Cape of Good Hope, and *Smilax herbacea* of the United States.

CARROLL, town and capital of Carroll County, western central Iowa, on the Chicago and Northwestern railroad, 67 miles E.N.E. of Sioux City. It is chiefly an agricultural center. Population 1890, 2,448.

CARROLL, Charles, of Carrollton, an American statesman, born in Annapolis, Maryland, Sep. 20, 1737; died in Baltimore, Maryland, Nov. 14, 1832. He was descended from one of the ancient septs of

Ireland, which traced its ancestry to the royal line of Munster. He was educated at the Jesuit college of St. Omer, at Rheims, in French Flanders, and in the college of Louis le Grand, Paris; studied civil law in Bourges and in the Middle Temple, London. In 1765 he returned to Maryland. At the outbreak of the Revolution he was the wealthiest man in the colonies, was ever ready to use his influence and means for the aid of liberty, and as early as 1770 had protested against arbitrary taxation. In December, 1774, he was one of the committee of correspondence for the province, and in 1775 was elected a member of the Council of Safety.

About this time he adopted the designation of Charles Carroll of Carrollton, to distinguish himself from a relative, Charles Carroll, a barrister, also of Annapolis. In January, 1776, he was appointed by the Continental Congress to visit Canada, with a number of commissioners, and induce those colonies to unite in the common cause of independence. On July 4, 1776, he was elected to represent Maryland in the Continental Congress, and signed the Declaration of Independence. The story that he first affixed the addition "of Carrollton" then is disputed. He was again a delegate to Congress in 1777, and served on the committee which visited Valley Forge to investigate complaints about General Washington. In 1788 he was elected the first Senator from Maryland under the constitution of the United States, serving until 1791. He was elected to the state senate, and served until 1801. In 1797 he was one of the commissioners to determine the boundary line between Maryland and Virginia. He inaugurated the Baltimore and Ohio railroad, July 4, 1828. He was the last surviving signer of the Declaration of Independence. His only son, Charles, married Harriet, the daughter of the Hon. Benjamin Chew, chief justice of Pennsylvania; his daughter Catharine was married to Robert Goodloe Harper, a distinguished Federalist of Maryland, and his daughter Mary was married to Richard Caton of Maryland, whose four daughters, noted for their beauty, were known at the court of George IV as "The American Graces." Three of them were married to English noblemen, the fourth, Emily, to John McTavish of Baltimore, Maryland.

CARROLL, Henry King, an American journalist and author; born at Dennisville, New Jersey, Nov. 15, 1848. His first position was that of assistant editor of *Hearth and Home*, a Methodist publication. He was later religious and political editor of the *Independent* of New York, and became chief editor of the *Papers and Proceedings of the Centennial Methodist Conference* (1885). He wrote *The World of Missions* (1881); *The Catholic Dogma of Church Authority* (1884); and *The Religious Forces of the United States* (1893).

CARROLL, John, Roman Catholic archbishop; born in Upper Marlboro, Maryland, in 1735; died in Georgetown, District of Columbia, Dec. 3, 1815. He was a cousin of Charles Carroll of Carrollton. He was educated in the College of St. Omer, in French Flanders, and at the Jesuit college at Liège, where he was ordained priest in 1759. Until 1771 he was professor of moral philosophy at St. Omer's and Liège, and when the Society of Jesus was suppressed in 1773, he was forced to leave the Continent, and went to England, where he conducted important negotiations with the French government regarding the property owned by the society in France. In 1774 he returned to Maryland, whose resistance to the crown enlisted his sympathies. The condition of the Roman Catholics was unhappy there at this time. The celebration of mass was prohibited, Roman Catholic schools were forbidden, and the members of this church were not allowed to bear arms. In February, 1776, he was appointed by the Continental Congress commissioner, with Charles Carroll of Carrollton, Samuel Chase and Benjamin Franklin, to visit Canada to seek co-operation in the struggle for American independence. After the Revolution, the Roman Catholics of the United States were anxious to have ecclesiastical jurisdiction of their own, independent of the vicar-apostolic of London, and petitioned the Pope to appoint a superior whose allegiance would be to the Federal government alone.

In 1784 Father Carroll was appointed to this post, and he then settled in Baltimore. In 1789 he was appointed first bishop in the United States, with his see in Baltimore. In 1788 he laid the foundation of Georgetown College, which was completed in 1791, and he established a theological seminary in connection with this, which was merged into that of St. Mary's, Baltimore, in 1792. He was also a founder of St. John's College, Annapolis, which subsequently gave him the degree of LL.D. In 1806 he laid the foundation of the Cathedral of Baltimore, which he also dedicated. Owing to the increasing number of Catholics, he caused Baltimore to be erected into an archiepiscopal see, with four episcopal sees as suffragans, and in 1808 he was made archbishop. His diocese then embraced Maryland, Virginia and the Southern states as far as the Gulf and the Mississippi. He was an ardent Federalist, and one of the most powerful factors of his church in this country. Congress invited him to deliver a panegyric on Washington on Feb. 22, 1800. His writings, which are chiefly controversial, include *An Address to the Roman Catholics of the United States of America; A Concise View of the Principal Points of Controversy Between the Protestant and Roman Churches;* etc.

CARROLL, Lewis, the pseudonym of Dodgson, Charles Lutwidge; q.v., in these Supplements.

CARROLL, Samuel Sprigg, an American soldier; born in Washington, District of Columbia, Sept. 21, 1832. In 1856 he graduated at West Point. During the Civil War he was engaged in the battles of Cedar Mountain, the Rapidan, Fredericksburg, Chancellorsville, Gettysburg, the Wilderness and at Spottsylvania, where he was severely wounded. He was brevetted brigadier-general of United States army in 1865, and in 1869 was retired, for disability from wounds, as major-general. He died at Tacomac Park, District of Columbia, Jan. 28, 1893.

CARROLLTON, town and capital of Carroll County, western central Georgia, on the Little Tallapoosa River, and on the Central of Georgia and the Chattanooga, Rome and Columbus railroads; by

the latter 59 miles S. of Rome. Its interests are principally commercial. Population 1890, 1,451.

CARROLLTON, city and capital of Greene County, southwestern Illinois, on the Litchfield, Carrollton and Western and the Chicago and Alton railroads; by the latter, 58 miles N. of St. Louis. It contains manufactories of iron, machinery, carriages and flour. Population 1890, 2,258.

CARROLLTON, town and capital of Carroll County, Kentucky, situated on the Ohio River, at the mouth of the Kentucky, 62 miles from Louisville. It is the seat of a seminary, and contains manufactories of cotton goods, woolen goods and flour. Population 1890, 1,720.

CARROLLTON, a village of Saginaw County, east-central Michigan, on the Saginaw River, and on the Michigan Central, the Cincinnati, Saginaw and Mackinaw, and the Flint and Pere Marquette railroads; by the last, it is eight miles S. of Bay City. It is situated in a rich agricultural district, and exports a large quantity of leaf-tobacco. Population 1894, 892.

CARROLLTON, city and capital of Carroll County, northwestern Missouri, on the Wakenda Creek; on the Atchison, Topeka and Santa Fé and the Chicago, Burlington and Kansas City railroads, 66 miles E.N.E. of Kansas City. It contains flour-mills and a woolen factory, and has a school building which cost $40,000. It is the seat of a Roman Catholic convent. Population, 3,878.

CARROLLTON, village and capital of Carroll County, central eastern Ohio, on the Cleveland, Canton and Southern railroad, 27 miles S.E. of Canton. It is principally an agricultural station. In 1890 the population was 1,228.

CARRONADE, a short iron gun, long superseded, named after the Carron Iron Works of Scotland, where it was first made in 1779. It was used in naval engagements at close range. It is lighter than ordinary guns, and has a chamber for powder, like mortars. For an illustration of this gun, see Vol. XI, p. 306.

CARROT. See AGRICULTURE, Vol. I, p. 369; HORTICULTURE, Vol. XII, p. 280.

CARRUTHERS, ROBERT, a Scotch journalist and author; born at Dumfries, Nov. 5, 1799, where he was educated and apprenticed to a bookseller and bookbinder. After his apprenticeship he went to Huntingdon, where he was the master of the national school, and published a *History of Huntingdon*. In 1828 he went to Inverness and conducted the Inverness *Courier*, one of the leading weekly journals of the north. Here he "discovered" Hugh Miller, many of whose earliest writings appeared in the *Courier*. Carruthers became associated with Robert Chambers in the publication of the *Cyclopædia of English Literature*, and contributed numerous articles to this ENCYCLOPÆDIA. He was for several years lecturer at the Philosophical Institution, Edinburgh, and received the honorary degree of LL.D. from Edinburgh University. He published a *Life of Pope* in 1858, and edited that poet's works. He died May 26, 1878.

CARRUTHERS, WILLIAM A., novelist; born in Virginia about 1800; died in Savannah, Georgia, about 1850. He was educated for the medical profession, but became famous as a writer of sketches and historical romances. Among his published works were *The Cavaliers of Virginia; or, The Recluse of Jamestown; The Kentuckian in New York; The Knights of the Horseshoe: A Traditionary Tale of the Cocked-Hat Gentry in the Old Dominion;* and *A Life of Dr. Caldwell.* He also published an account of a perilous ascent of the Virginia Natural Bridge.

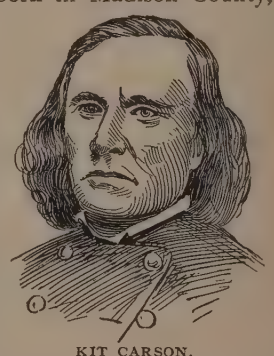
CARS, FREIGHT. See RAILROADS, in these Supplements.

CARS, PASSENGER. See RAILROADS, in these Supplements.

CARSE, a term applied in Scotland to low lands along river mouths. Carse soils usually consist of argillaceous deposits, which produce crops of great luxuriance. See SCOTLAND, Vol. XXI, p. 524.

CARSON, ALEXANDER, an Irish preacher; born in County Tyrone in 1776; educated at Glasgow University, and was a Presbyterian minister at Tubbermore. In 1805 he left the Presbyterian Church and became a Baptist, under the influence of Robert Haldane. During the latter part of his life he favored the precepts of the peculiar Sandemanian order, which practiced asceticism, and held property in common for the good of the church; among other customs were the kiss of brotherhood, the Sunday love-feast, and the abstention from blood and the flesh of any strangled animal. Carson was at no period in fellowship with the Baptists of England, though he was claimed by William Jones as an adherent of "Scotch Baptists" of England. He was the author of *Baptism: Its Mode and Subjects* (1831), and died at Belfast, Aug. 24, 1844.

CARSON, CHRISTOPHER ("Kit Carson"), an American frontiersman; born in Madison County, Kentucky, Dec. 24, 1809; died at Fort Lynn, Colorado, May 23, 1868. His boyhood was spent in what was then the wilderness of Missouri, and at the age of 17 he joined a hunting party, and commenced a roving life on the plains. He served as guide for General John C. Frémont in his explorations; became familiar with more Indian tribes than any man since his time, and could speak their dialects fluently; assisted in making treaties between the United States and the Indians; served the government in New Mexico, Colorado and the Indian Territory during the Mexican and Civil wars, and for his conduct in the latter was brevetted brigadier-general.



KIT CARSON.

CARSON CITY, a city of Nevada, capital of the state and county seat of Ormsby County, in the northwestern corner of the state. It is beautifully situated in the midst of grand and picturesque scenery, on a plateau at the base of the Sierra Nevadas, about 15 miles S. of Virginia City. It contains a United States branch mint, railroad-shops

and offices, various manufactories, and several mills for extracting gold and silver, which are found in the vicinity. Carson City was founded in 1858; its incorporation dates from 1876. Population 1890, 3,950.

CARSON RIVER, a stream of Nevada, 150 miles long. It rises in the Sierra Nevada Mountains, and flows northeast into Carson Lake, a body of water 15 miles long, which has no outlet.

CARSTENS, Asmus Jakob, a Danish artist; born near Schleswig in 1754; died at Rome in 1798. In 1776 he went to Copenhagen, where he produced his *Baldur's Death* and *Æolus and Ulysses*. For five years (1783–88) he maintained himself by portrait-painting in Lubeck. He subsequently went to Berlin, where his great composition, the *Falls of the Angels*, with 200 figures, gained for him an appointment as professor in the Academy, while his decoration of a salon in the Dorville Palace obtained for him an introduction to the king and a pension. He then visited Rome and devoted himself to the study of the works of Michael Angelo and Raphael. His *Visit of the Argonauts to the Centaur Chiron* was distinguished by purity of style, beauty of form and fine distribution of light. He lost his position in Berlin, and his last days were days of penury and dejection, but his work had marked influence on German art.

CARTEL, during the time of war, an agreement between the belligerents for an exchange of prisoners, or for some reciprocal advantage. Sometimes the epithet is applied to a ship commissioned to convey the exchanged prisoners or to carry messages to the enemy.

CARTER, Franklin, an American scholar; born at Waterbury, Connecticut, Sept. 30, 1837; educated at Yale and Williams colleges, and studied in Berlin. In 1872 he became professor of German in Yale College, and in 1881 was made president of Williams College. He translated Goethe's *Iphigenie auf Tauris* (1879), and published a *Study of Mark Hopkins* (1892).

CARTER, Peter, publisher; brother of Robert; born in Earlston, Berwickshire, Scotland, July 19, 1825. In 1832 he came to the United States with his parents; received a common-school education, and in 1848 was admitted as partner in the publishing house of Robert Carter and Brothers, New York City. He was connected with temperance, charitable and Sunday school work, and wrote *Crumbs from the Land o' Cakes* (1851); *Scotia's Bards* (1853); *Bertie Lee* (1862); *Donald Frazer* (1867); *Little Effie's Home* (1869).

CARTER, Robert, publisher; born near Abbottsford, Berwickshire, Scotland, Nov. 2, 1807; died in New York City, Dec. 28, 1889. His father was a weaver by trade, and his son had little opportunity for gratifying his love of study, being compelled to help in supporting the family. He diligently improved his opportunities, acquired some education, and at the age of fifteen opened a night-school in his father's cottage. He entered the University of Edinburgh, and made rapid progress, but in 1831 came to America, where his first occupation was school-teaching in the city of New York. Schuyler Colfax was one of his pupils in Latin and Greek. In 1848 he established the publishing firm known as Robert Carter and Brothers. He was a Presbyterian, and frequently a delegate to the Synod and the General Assembly.

CARTER, Robert, editor; born in Albany, New York, Feb. 5, 1819; died in Cambridge, Massachusetts, Feb. 15, 1879. His education was obtained at the common schools and at a Jesuit college of Chambly, Canada. In 1841 he started, in company with James Russell Lowell, a magazine called *The Pioneer*, of which only three numbers were issued. In 1847 he was private secretary to the historian Prescott, and after the latter's death wrote an elaborate account of his habits and character. In 1851 he became editor of the Boston *Commonwealth*, the organ of the Free Soil party. In 1855 Mr. Carter was one of the editors of the Boston *Telegraph;* the following year he edited the *Atlas;* from 1857 to 1859 he was Washington correspondent for the *New York Tribune;* from 1864 to 1869 edited the *Rochester Democrat;* and from 1870 to 1873 edited *Appleton's Journal.* Mr. Carter wrote important articles in the first edition of the *American Cyclopædia;* the articles on Egypt, Hindustan and the history of the United States being by him. He assisted in a revision of that cyclopædia. Mr. Carter traveled in Europe for his health; wrote *A Summer Cruise on the Coast of New England*, and at the time of his death left an incomplete volume of memoirs.

CARTER, Samuel Powhatan, naval officer and soldier; born in Elizabethtown, Carter County, Tennessee, Aug. 6, 1819. He studied at Princeton; served as midshipman in the navy; was promoted and assigned to the *Ohio;* was engaged off the Mexican coast during the Mexican War; was a member of the expedition which captured the barrier forts near Canton, China (1856); was appointed instructor in seamanship at Annapolis the following year, and when the war broke out was transferred to the War Department for a time, and assigned to the task of organizing troops in eastern Tennessee. He was assigned to active duty afterward, and while in the field was present at Zollicoffer's repulse at Wild Cat, Kentucky; fought at Cumberland Gap; led the cavalry expedition which destroyed nearly one hundred miles of railroad track in Tennessee; assisted at the siege of Knoxville; and held various commands up to 1866, when he was mustered out of service, having been brevetted major-general in the preceding year. Returning to the navy, he commanded at the Annapolis Academy from 1869 to 1872, and received several promotions, being commissioned commodore in 1878. He retired from the service three years later, and was made rear-admiral in 1882. He died in Washington, D. C., May 26, 1891.

CARTERET, Philip, English navigator; sailed as lieutenant in Byron's voyage, and commanded the second vessel in Wallis's expedition to the southern hemisphere (August, 1766). In the following April, while clearing the Strait of Magellan, Carteret's vessel was separated from the others by a hurricane, and he proceeded alone, discovering Pitcairn, Gloucester, and a number of other small

islands. He explored the strait between New Britain and New Zealand, and drew a map of the western coast of Celebes. He returned round the Cape of Good Hope to England, March 20, 1769. His long voyage added much to the geographical knowledge of his time. He retired from active service in 1794 with the rank of rear-admiral, and died in Southampton, July 21, 1796.

CARTERSVILLE, city and capital of Bartow County, northwestern Georgia, on the East and West and the Western and Atlantic railroads, 51 miles N.W. of Atlanta. Gold and copper are found in the vicinity. It is a shipping-point for pig-iron and cotton. Population 1890, 3,171.

CARTERVILLE, a city of Jasper County, southwestern Missouri, on the Missouri Pacific railroad, 10 miles S.W. of Carthage. It is important as a mining center, producing large quantities of zinc and lead ore. In 1890 the population was 2,884.

CARTESIAN DEVIL DIVER OR BOTTLE-IMP, a philosophical toy, consisting of a small hollow figure, usually in the fancied form of a demon, with a hole near the top. This figure, filled partly with air and partly with water, floats in a tall glass vessel nearly full of water, and covered with an air-tight piece of bladder or India-rubber. When this cover is pressed down, the air beneath is compressed, and water enters the floating figure until the air within is brought to an equal degree of compression. In consequence the figure sinks, not rising again till the pressure is removed.

CARTHAGE, town and capital of Hancock County, western Illinois, 15 miles E. of Keokuk, on the Toledo, Peoria and Western, and the Chicago, Burlington and Quincy railroads. It is the seat of a Lutheran college and of a high school. Population 1890, 1,654.

CARTHAGE, the capital of Jasper County, southwestern Missouri, on Spring River, and on the Missouri Pacific and St. Louis and San Francisco railroads, 60 miles W. from Springfield and 150 miles S. from Kansas City. It contains manufactories of machinery, wind-mills, woolen goods, furniture, plows, etc., for which Spring River furnishes an abundant water-power, and the most extensive stoneworks in the state. Mines of lead, zinc and cobalt and quarries of limestone are successfully worked in the immediate vicinity. During the Civil War, July 5, 1861, Carthage was the scene of a battle between General Sigel, with 1,500 Union troops, and General Price and Governor Jackson, with 3,500 Confederates. Sigel was superior in artillery, but in that alone, and when the Confederate cavalry attacked him, he was forced to retreat to Carthage and thence eastward to Sarcoxie, in order to protect his supplies. His loss in killed and wounded was less than 50, while the Confederates lost about four times that number. The city is lighted by gas and electricity, provided with efficient water and sewerage systems, street-railways, etc. Population 1890, 7,981.

CARTHAGE, a village and railroad junction of Jefferson County, northwestern New York, on the Black River, and on the New York Central and Hudson and the Rome, Watertown and Ogdensburg railroads, 17 miles E. of Watertown. Its extensive water-power is utilized in forges, foundries and manufactories, where leather, nails, furniture and machinery are made. Population 1890, 2,278.

CARTHAGE, CAPE, a headland of North Africa, projecting into the Mediterranean, opposite the island of Sicily. Traces of the ancient city of Carthage are found on it to the north of the Tunis lagoon.

CARTHAGO, NOVA. See CARTAGENA, in Spain, Vol. V, p. 140.

CARTHAMINE, a dye obtained from safflower. See SAFFLOWER, Vol. XXI, p. 145.

CARTIER, SIR GEORGE ÉTIENNE, BART., a Canadian statesman; born in St. Antoine, Quebec, Sept. 6, 1814; died in England, May 20, 1873. He was a lawyer who took an active part in the politics of Canada. He participated in the Lower Canada rebellion of 1837, and 11 years later was elected member of Parliament. In 1857 he was attorney-general for Lower Canada, in which office he effected many reforms; he was a member, the same year, of Macdonald's reorganized Cabinet, and of the Cartier-Macdonald Ministry the following year. He was the leader of the French-Canadian Conservatives in Parliament.

CARTILAGE. See ANATOMY, Vol. I, pp. 851–856.

CARTRIDGE. See AMMUNITION, Vol. I, p. 745.

CARTRIDGE–CASE. See GUNMAKING, in these Supplements.

CARTWRIGHT, PETER, an American clergyman; born in Amherst County, Virginia, Sept. 1, 1785; died near Pleasant Plains, Illinois, Sept. 25, 1872. His father, a soldier in the Revolutionary War, removed to Logan County, Kentucky, in 1793, where Peter's youth was spent in hardship. He was a wild boy, but was converted at a camp-meeting at Cane Ridge and began to preach; in 1803 was received into the regular ministry of the Methodist Episcopal Church, and in 1806 was ordained an elder. In 1816 he was chosen a delegate to the General Conference in Baltimore, Maryland, and many times subsequently. In 1823 he removed from the Cumberland district to Sangamon County, Illinois, and after a few years was elected to the legislature. He was an early opponent of slavery, but adhered to the Democratic party, and in 1846 was a candidate for Congress, in opposition to Abraham Lincoln, who defeated him by a majority of 1,500. He was an original character and an energetic and powerful preacher. His wit was keen and rough, and his quaint, eccentric habits and fund of stories made him popular wherever he went. His strong, hard sense often shaped the policy of his denomination. He published several pamphlets, the most famous of which was *The Controversy with the Devil* (1853). His *Autobiography* was edited by William P. Strickland (1856).

CARTWRIGHT, SIR RICHARD JOHN, Canadian statesman; born in Kingston, Dec. 4, 1835. He completed his education at Trinity College, Dublin, Ireland, and, entering Parliament in 1863 as a Conservative, he became in 1870 a leader of the Liberals. He was Minister of Finance from 1873 until

1878, and was knighted in 1879. He has introduced many reform motions in Parliament, those bearing on the question of finance being the most important.

CARUS, JULIUS VICTOR, a German zoölogist; born at Leipsic, Aug. 25, 1823. He studied medicine and surgery at Leipsic, subsequently at Würzburg and Freiburg, and in 1849 went to Oxford as keeper of the Museum of Comparative Anatomy. In 1851 he returned to Leipsic, and in 1853 was there placed in the chair of comparative anatomy. Carus lectured at Edinburgh for Wyville Thomson during his absence on the *Challenger* expedition. His writings, numerous and valuable, consist chiefly of monographs devoted to particular departments of zoölogy. The more general of his works are *System der Thierischen Morphologie* (1853); *Handbuch der Zoölogie* (1863); *Geschichte der Zoölogie* (1872); and *Prodromus Faunæ Mediterraneæ* (1884).

CARVALHO, MARIE CAROLINE FÉLIX (MIOLAN), French opera-singer; born at Marseilles, Dec. 31, 1827. She received her first instruction from her father, Felix Miolan, an oboe-player, and then from Duprez at the Paris Conservatoire (1843–47), receiving the first prize in singing, and making her *début*, at Duprez's benefit, Dec. 14, 1849, in the first act of *Lucia*, and in the trio in the second act of *La Juive*. From this year until 1856 she sang at the Opera Comique, making her reputation as Isabelle in *Le Pré aux Clercs*, and as the heroines in *Giralda* and *Les Noces de Jeanette*. In 1853 she married Leon Carvalho, then engaged at the same theater. Mme. Carvalho sang for the next ten years at the Lyrique, appearing in a new opera, *La Fanchonnette*, and during this period established her right to be regarded as the first female singer of the lyric stage in France. She retired from the stage, June 9, 1885. Just two years later she appeared in a benefit concert given for the sufferers at the fire of the Opéra Comique, singing in a duet from *Mireille* with Faure. She died at Dieppe, July 10, 1895.

CARVER, JOHN, governor of Plymouth colony; born in England about 1590; died in Plymouth, Massachusetts, April, 1621. He was a member of the Puritan company at Leyden, and was an agent sent to secure permission from the Virginia company to found a colony in America. Carver came over in the *Mayflower*, was elected governor by the Pilgrims while the ship was in the harbor of Provincetown, and was re-elected in March, 1651, but died suddenly, the following month.

CARY, ALICE, authoress; born near Cincinnati, Ohio, April 20, 1820; died in New York City, Feb. 12, 1871. Her youth was spent where the opportunities for education and culture were very limited. At the age of 18 she began to write prose and verse for the press, and her work met with acceptance. In 1852 she removed to New York City, where she attained literary eminence. Among her published works are *Clovernook Papers* (1851); *Hagar: A Story of To-day; Lyra, and Other Poems* (1852); *The Clovernook Children* (1854); *Married, Not Mated* (1855); *Pictures of Country Life* (1859); *Lyrics and Hymns* (1866); *The Bishop's Son; The Lover's Diary;* and *Snow-Berries* (1867).

CARY, ANNIE LOUISE, singer; born in Wayne, Kennebec County, Maine, Oct. 22, 1842. She graduated at the Female Seminary in Gorham, Maine, in 1862, and in 1866 went to Italy for the purpose of having her voice trained by Giovanni Corsi of Milan. She made her *début* in Italian opera in Copenhagen, and for the next few months sang in the principal European cities. In 1869, having further improved her voice by study at Baden-Baden and Paris, she came to America and sang in Steinway Hall, New York. For 12 years she sang in America, with the exception of two winters (1875–76 and 1876–77) spent in Russia. Her voice was a rich contralto of singular sweetness. In 1882 Miss Cary married Mr. Raymond of New York, and retired from the stage.

ANNIE LOUISE CARY.

CARY, PHŒBE, authoress, sister of Alice Cary; born near Cincinnati, Ohio, Sept. 24, 1824; died in Newport, Rhode Island, July 31, 1871. Her life and her literary work were closely connected with that of her sister. She began to write poetry at the age of 17, one of her first poems being the hymn so widely known, commencing, "One sweetly solemn thought." As mistress of the New York home she had less leisure for writing than her sister, and she attempted but little prose. The *Poems of Alice and Phœbe Cary* are mostly the work of Alice. Phœbe's lines are more buoyant and cheerful in tone than are her sister's. Her published works are *Poems and Parodies* (1854); *Poems of Faith, Hope and Love* (1867); and a number of the hymns published by Rev. Dr. Deems in *Hymns for All Christians* (1869). Mary Clemmer Ames Hudson, an intimate friend of the sisters, published a memorial of them.

CARY, SAMUEL FENTON, Congressman; born in Cincinnati, Ohio, Feb. 18, 1814; graduated at the Miami University in 1835 and the Cincinnati Law School in 1837; served as Independent Republican in Congress from 1867 to 1869, and was the Republican who voted against the impeachment of President Johnson. In 1876 Peter Cooper and Samuel F. Cary were the candidates on the national Greenback ticket.

CARYATIDES, a columnar ornament. See ARCHITECTURE, Vol. II, pp. 407, 408.

CARYOCAR, a genus of large trees of the family *Ternstrœmiaceæ*, natives of the tropical parts of America. It yields a good timber for ship-building, and produces the delicious nuts called *butternuts*. Its flowers are large and of a purplish red color. The fruit is a sort of drupe, the fleshy part of which consists of a butter-like substance which is used in cookery instead of butter.

CARYOPHYLLACEÆ, a family of exogenous plants, containing upward of one thousand known species, mostly herbaceous, distributed all over the world. Most of them are inconspicuous weeds, but many produce beautiful flowers, and are favorites in many gardens, as the pink, carnations, sweet-williams,

etc. A few contain saponin, and afford a substitute for soap.

CARYOPSIS, in botany, a fruit in which the seed and pericarp so closely adhere as to be inseparable and even undistinguishable. The term is exclusively applied to the characteristic fruit (commonly known as the "seed") of grasses. Common illustrations are "grains" of wheat, corn, etc.

CARYOTA, a genus of southern Asiatic palms, belonging to the section of "feather-palms," with bipinnate leaves and fruit a berry. The best-known species is *C. urens*, which yields an abundance of sugary sap, from which sugar or syrup is obtained by boiling, or "toddy" by fermentation, or "arrack" by distillation. The pith also yields a much-used starch, resembling sago, and the leaves a very valuable fiber.

CARYSFORT REEF, is situated off the southern coast of Florida, in lat. 25° 13′ 15″ N., and long. 80° 12′ 45″ W. It is a dangerous coral reef, and has an iron-pile lighthouse 112 feet high, furnished with a powerful flash-light.

CASABIANCA, Louis, a French naval officer; born at Bastia about 1755; sat in the National Convention of 1792, and in 1798 was captain of the flagship *L'Orient* in the expedition to Egypt. He was mortally wounded at the battle of the Nile, Aug. 1, 1798; the ship caught fire; his ten-year-old son would not leave him, and both perished. Mrs. Felicia Hemans has immortalized the boy and incident in one of her most popular poems.

CASAS, Bartolome de las. See Las Casas, Vol. XIV, p. 319.

CASATI, Gaetano, an Italian African explorer; born at Lesmo in 1838; educated there and at Milan and Pavia. In his twenty-first year he joined the army in Piedmont, and in 1867 reached the rank of captain. He resigned in 1879, determined to become an African explorer, sailing thither from Genoa, in December of that year. He arrived at Khartoum, May, 1880, and succeeded in meeting his countryman, Gessi Pasha, governor of the region around Bahr-el-Gazelle. In the middle of October of this year he was able to proceed to Rumbeck, after which he was not heard of until a letter reached his patrons, the Societa d' Explorazione Commerciale d' Africa, who had fitted out his expedition, dated Dec. 29, 1881, stating that he had been a prisoner, and had only succeeded in making his escape on the 7th of that month. Two years later he met Emin Pasha at Lado, and also Junker, a Russian explorer. This was at the time the Mahdi was making a stir, and the three adventurers were cornered in Egypt. The expeditions sent to rescue them, conducted by Dr. Fischer and Dr. Lenz, both failed; but Henry M. Stanley was successful in reaching Emin. Casati then went to live as a "resident" in King Kabba Rega's territory, where he acted as postmaster to Emin in finding means of transmitting the latter's correspondence to Europe. Kabba detained him in semi-captivity. Stanley's arrival in 1889 set him free. His *Ten Years in Equatoria* was published in 1891.

CASCADE RANGE. See Oregon, Vol. XVII, p. 822; Washington, Vol. XXIV, p. 385.

CASCARILLA, a name given to a number of South American bitter barks used in medicine, notable among which is the bark of *Croton Eleutheria*, a genus of the family *Euphorbiaceæ*.

CASCO BAY, a body of water extending along the coast of Cumberland County, southern Maine, for about 20 miles, from Cape Elizabeth to Fuller's Rock, inclosing about three hundred islands. The city of Portland is at the western end of the bay.

CASE, as a legal term, means any action or proceeding in law or equity. It is synonymous with "cause," or "cause of action." The word has also another and distinct signification. In this latter sense it is a shortening of the term "trespass on the case," and is the technical name applied to a form of action which may be maintained to recover damages for injuries to the person or property. In its broadest sense, *case* includes what have now become known as distinct forms of action, *assumpsit* and trover. In the sense in which it is now used it is a form of action to recover damages for injuries committed without force, or if forcible, which damage the plaintiff consequentially, and does not include damages for the breach of a contract. Thus an action for damages on account of slander, malicious prosecution, deceit or injuries which result from negligence, is properly brought in case.

CASE, Augustus Ludlow, rear-admiral, United States navy; born in Newburgh, New York, Feb. 3, 1813; entered the navy as midshipman in 1828; was promoted through the several grades until 1872, when he was made rear-admiral, and in 1875 was placed on the retired list. He served during the Mexican War, the Civil War, and in 1865 was appointed fleet-captain of the European squadron. In 1874 the combined European, North Atlantic and South Atlantic squadrons, which, at the time of the *Virginius* difficulties, were grouped in the harbor of Key West, were under his command. He died in Washington, D. C., Feb. 17, 1893.

CASE-HARDENING. See Iron, Vol. XIII, p. 342.

CASELLI, Jean, an Italian inventor; born at Sienna, May 25, 1815; pursued his studies at Florence, where he had for his master the famous physicist, Leopold Nobili. The first writing of Caselli was on the life and work of his master. Caselli was made a member of the Italian Athenæum, and read many interesting papers before that society, notably a critical discourse on the *History of the Italian Republics of the Middle Ages*, by De Sismondi. In 1836 he took religious orders and accepted a benefice. In 1841 he was called to Parma as tutor to the children of Count Sanvitale. After a short period of exile on account of a political vote Caselli returned to Florence and devoted himself entirely to the study of electrical science. He worked with apparatus constructed by himself, with the assistance of his son, Ludovic, a distinguished mechanician. In 1854 he founded *La Recreazione*, a journal for the purpose of popularizing physical sciences. In 1856, as a result of his labors, he succeeded in perfecting a new system of telegraphy, which he termed "pantelegraphy," by which the message was transmitted as originally written. This system of autograph

telegraphy was at once adopted in France and in Russia, and was also extended into China and Persia. For many years Abbé Caselli was engaged in pertecting a practicable electric motor, and constructed one, at the expense of Napoleon III, in 1865. He was made an officer of the Order of St. Maurice and Lazarus. Died at Florence, Oct. 7, 1891.

CASEIN. See CHEESE, Vol. V, pp. 455, 456.

CASEMATE, originally a loopholed gallery excavated in a bastion, through which artillery could fire upon an enemy who had gained possession of the ditch. As defense from shells became more important, the term was subsequently applied to a bomb-proof vault in a fortress for the security of the defenders, without direct reference to the annoyance of the enemy.

CASE-SHOT. See AMMUNITION, Vol. I, p. 745.

CASEY, SILAS, American soldier; born at East Greenwich, Rhode Island, July 12, 1807; graduated at West Point in 1826; served on the frontier in the Florida war, in the war with Mexico, where, at Chapultepec, he was severely wounded while leading the assault, and in the Civil War. He drilled volunteers at the national capital, fought at Fair Oaks, and presided over the board which examined officers for colored troops. At the close of the war he was brevetted major-general of the United States army, and was retired from the service in 1868. He was the author of *Infantry Tactics* (1862) and *Infantry Tactics for Colored Troops* (1863). He died at Brooklyn, Jan. 22, 1882.

CASEY, SILAS, JR., an American naval officer; born in Rhode Island, Sept. 11, 1841; graduated at the Naval Academy in 1860, and rose successively to the positions of lieutenant, lieutenant-commander, and in 1874 commander. He took part in the first attack on Fort Sumter, and in other engagements in Charleston harbor. In 1886 he commanded the receiving-ship *Dale*, and in 1891 the cruiser *Newark*.

CASEY, THOMAS LINCOLN, an American military engineer; born at Madison Barracks, near Sackett's Harbor, New York, May 10, 1831; was graduated at West Point (1852) and became principal assistant professor of engineering at West Point (1857–59). He commanded a detachment of engineer troops in the district of Oregon from 1859 until 1861, and in the summer of the latter year was on the staff of the general commanding the department of Virginia. He had charge of fortifications on the coast of Maine and New Hampshire from 1861 until 1867, and was assistant to the chief of engineers from 1867 until 1879. He was in charge of the public buildings and grounds of the District of Columbia from 1877 until 1881, and of the construction of building for the State, War and Navy departments. In 1888 he became chief of engineers, with the rank of brigadier-general. He was placed on the retired list in 1895.

CASHMERE. See KASHMIR, Vol. XIV, p. 9.

CASHMERE GOAT. See GOAT, Vol. X, p. 709.

CASIMIR OR KAZIMIERZ, five Polish kings. See POLAND, Vol. XIX, pp. 286–290, 294, 295.

CASIMIR-PERIER, JEAN PAUL PIERRE, ex-President of the French Republic; born Nov. 8, 1847; the son of Casimir Victor Perier, Minister of the Interior in 1872 under Thiers, and grandson of Casimir Perier, Prime Minister to Louis Philippe in 1831. Jean Paul was trained for a political career, and during the Franco-Prussian war greatly distinguished himself in the siege of Paris as captain of the Mobiles d'Aube, receiving the cross of the Legion of Honor as a reward therefor (1871). Next year he was appointed by his father Under-Secretary of the Department of the Interior. In 1874 he was elected to the Chamber of Deputies for Nogent-sur-Seine as a Republican. In 1877 he entered the Cabinet as Under-Secretary of State in the Department of Public Worship and Instruction, and was Under-Secretary of War in 1883. In 1885 he was again elected to the Chamber, this time as an Opportunist, and also in 1880. In 1890 he was elected vice-president of the Chamber of Deputies and president of the Commission on the Budget. In 1893 he was prevailed upon to form a ministry. His ministry was of short duration, though there are those who insinuated that he desired its dissolution, so that he could prosecute his candidature for the presidential succession. The assassination of Carnot brought about an immediate contest, and Perier was elected, June 27th, his chief opponent having been M. Brisson (q.v., in these Supplements). The election of M. Gerault-Richard, who had been sentenced to one year's imprisonment and a fine for publishing an article reflecting upon the President, and the election of M. Brisson, Dec. 18, 1894, to the presidency of the Chamber of Deputies, annoyed the President deeply, for he was a man who had a keen sense of the dignity becoming his office, and he resigned, Jan. 15, 1895. Here may be recalled the words he used upon his acceptance of the presidency: "The weight of responsibility is too heavy for me to speak my gratitude. I love my country too well to be happy on the day when I become its chief." These words reflect the sentiments of a high-minded man.

CASINO, a game of cards, in which the object is to obtain the most points, consisting of certain counts and cards of a recognized value. The game can be played by two or more, by single or individual opponents or partners. The cards are dealt one, two or three at a time, provision being made also for a hand dealt to the table, the faces of which are turned up. The game proceeds by taking tricks, in three ways: *by pairing*, that is, by matching a card on the table by one in the hand, of equal denomination; *by combining*, that is, by collecting from the board all the cards whose united number of spots equal that of a card in the hand; and *by building*, that is, by combining cards on the table with one in the hand, the trick, if it comes round without being captured by an opponent, being taken by the card of equal denomination reserved for that purpose. The points in the regular game are: cards, 3; big casino (the ten-spot of diamonds), 2; little casino (the two-spot of spades), 1; spades, 1; each ace, 1; the total points being 11 for each deal. If the cards are equal (26) in each party's hand at the end of the rubber, cards are said to be "not out," and are not counted to either party. Sometimes another count

is introduced, called "sweeps"; that is, when, by any of the three modes above described, a trick is taken which clears or sweeps the board; this necessitates the next in hand playing out a card without any advantage, in fact at a loss. When "sweeps" are played, each counts one point. Casino is a game of skill, as will be at once seen; for it needs a memory of the cards which are out and taken, so as to avoid the capture of a trick in process of building up before it comes round, of preventing similarly the capture of the other counting-points, especially the casinos. The number of points to a game are usually 51, but any number can be agreed upon.

CASINO. See MONTE CASSINO, Vol. XVI, p. 778.

CASPARI, KARL PAUL, a Norwegian exegete and church historian; born at Dessau Anhalt, Feb. 8, 1814; became professor of theology at Christiania in 1857. His Arabic grammar (4th ed. 1875) is in high repute, and his contributions to the study of the Old Testament include works on Obadiah, Isaiah, Micah and Daniel. Besides his *Kirchenhistorische Anekdota* (1883), he published at Christiania *Quellen zur Geschichte des Taufsymbols und der Glaubensregel* (2 vols., 1866–69), extensions of which appeared in 1875 and 1879. Died at Christiania, April 11, 1892.

CASPER, town and capital of Natrona County, east-central Wyoming, on the North Platte River, and the terminus of a branch of the Fremont, Elkhorn and Missouri Valley railroad, 240 miles N.E. of Cheyenne. It is supported by its mining industries. Population 1890, 544.

CASSAGNAC, PAUL ADOLPHE DE. See GRANIER DE CASSAGNAC, in these Supplements.

CASSAREEP, an antiseptic and condiment. See CASSAVA, Vol. V, p. 182.

CASSATION, COURT OF. In the law of France, the act of annulling the decision of a court or judicial tribunal is called cassation; and the function of cassation, as regards the judgments of all the other courts, is assigned to a special tribunal, called the court of cassation. See FRANCE, Vol. IX, p. 511.

CASSATT, MARY, an American artist; born in Pennsylvania, and residing in Paris, where she studied under Soyer and C. Bellay, making her *début* at the Salon of 1874 with *Ida*. She has studied in Spain, and shows a partiality for Spanish subjects. In 1878 she exhibited, in Paris, works exhibiting the influence of the impressionist school. She has exhibited in America *The Music Lesson; After the Bull Fight;* and *At the French Theater*.

CASSELL, JOHN, founder of the English publishing firm of Cassell and Company, the son of a Manchester innkeeper; born Jan. 23, 1817; died April 2, 1865. He had no early educational advantages, but fitted himself for his later work by careful self-culture while employed as an apprentice joiner. He went to London in 1836, where he was for some time established as a tea and coffee merchant. Turning his attention to literary work, he issued his *Working Man's Friend* (1850); *Illustrated Exhibitor* (1851); *Popular Educator* (1852), the most popular of all his works, which, in a revised form, is still on sale; and *Family Paper* (1853). In 1859 he entered into partnership with Messrs. Petter and Galpin, and before his death he shared in the prosperity of one of the largest publishing houses of modern times.

CASSELTON, a thriving town of Cass County, southeastern North Dakota, situated in the fertile wheat-producing valley of the Red River of the North, about 25 miles W. of Fargo, on the Northern Pacific and Great Northern railroads. Population 1890, 840.

CASSIA, a plant. See SENNA, Vol. XXI, p. 664.

CASSICAN, a South American bird of the genus *Cassicus*, resembling the orioles. They are gregarian, and prefer to live near human habitations. They have remarkable power of imitating other birds.

CASSIDARIA, a genus of gasteropod mollusks of the family of helmet-shells (*Cassidæ*). The living species live in the warmer seas. There are many fossil species in the Cretaceous and Tertiary formations.

CASSIDY, WILLIAM, journalist; born in Albany, New York, Aug. 12, 1815; died there, Jan. 23, 1873. He was a graduate of Union College in 1834; studied law and was admitted to the bar, and in 1840–42 was state librarian. In 1843 he became editor of the Albany *Atlas*, a Democratic daily. In 1856 the *Atlas* and *Argus* were consolidated, and he became editor. In 1865 the paper was called the *Argus*. Mr. Cassidy, from 1868 till 1873, was secretary of the Democratic State Committee, and framed the celebrated antislavery plank which suffered defeat at the convention at Herkimer. In 1872 Governor Hoffman appointed him as one of a committee of sixteen to revise the constitution.

CASSIMERE, a soft, fine woolen dress fabric, usually in plain colors and twilled, used for men's wear. An imitation of it is made of cotton and wool. Cashmere (from which word the former is derived) is a fine, costly fabric, made in Cashmere, in the Himalayas, and spun from the yarn made from the flossy wool of the Cashmere goat. This fabric is best known in the form of cashmere shawls. A coarse worsted variety of cassimere is known in Scotland, where it is manufactured, as kerseymere, which word is probably a corruption of cassimere.

CASSIN, JOHN, an American ornithologist; born near Chester, Pennsylvania, Sept. 6, 1813. His specialty was description and classification. He was one of the most active members of the Academy of Natural Sciences, Philadelphia, contributing much to its journal. His works include *Illustrations of the Birds of California, Texas, Oregon, British and Russian America*, commenced in 1855; *Zoölogy of the United States Exploring Expedition; Quadrupeds and Birds* (1855); *Zoölogy of Gillies's United States Astronomical Expedition to Chile* (1855); *American Ornithology*, a general synopsis of North American ornithology, containing descriptions and figures of all North American birds not given by former American authors (1856); etc. He died in Philadelphia, Jan. 10, 1869.

CASSINO. Same as CASINO, in these Supplements.

CASSIOPEIA, a beautiful constellation of the northern hemisphere, supposed to represent the

wife of Cephus sitting in a chair with a branch in her hand. In 1572 there appeared in the constellation a new star, which was brighter than Venus. The star gradually diminished in luster, and in March, 1574, it disappeared. See also under ANDROMEDA, Vol. II, p. 22.

CASSIQUIARE, a river of southern Venezuela, South America. It is a small effluent of the Orinoco, and gradually increases until, at its union with the Rio Negro, it attains a width of six hundred yards. By means of this singular river, water communication is established, through the Amazon, Orinoco, and their affluents, between the interior of Brazil and the Carácas in Venezuela.

CASSITERIDES, islands. See PHŒNICIA, Vol. XVIII, p. 806.

CASSITERITE, an ore of tin. See MINERALOGY, Vol. XVI, p. 387.

CASSIUS PARMENSIS, so named from his birthplace, Parma, was one of the murderers of Cæsar, 43 B.C. He took an active part in the war against the triumvirs, and after the death of Brutus and Cassius, joined Pompey in Sicily with the fleet which he commanded. He followed the fortunes of Antony after Pompey's defeat, going to Athens, subsequently to the battle of Actium, and was put to death by the order of Octavianus, 30 B.C. He was a poet whose works were prized, and wrote two tragedies, *Thysetes* and *Brutus*.

CASSIUS, PURPLE OF, a coloring substance of very ancient use, which is prepared by adding a mixed solution of protochlorid and bichlorid of tin gradually to a solution of chlorid of gold, when a more or less abundant precipitate of double stannate of gold and tin is thrown down. Purple of cassius is employed by the potter to communicate a rich purple or rose tint to fine china, and it also imparts the red color to Bohemian glass.

CASSIVELLAUNUS OR CASSIBELAN, a Celtic chief. See BRITANNIA, Vol. IV, pp. 352, 353.

CASSOCK, a long, loose coat worn by the Episcopal and Catholic clergy. It has a single upright collar, and reaches to the feet. Its common color is black for all orders of the clergy. In the Anglican Church, on state occasions, the bishops frequently wear purple. In the Roman Catholic Church cassocks vary in color according to the dignity of the wearer, priests wearing black, bishops purple, cardinals scarlet, and the pope white.

CASSOPOLIS, village and capital of Cass County, southwestern Michigan, on the Michigan Central and the Chicago and Grand Trunk railroads, 98 miles S.W. of Lansing. It contains manufactories of lumber, iron, sash, blinds and furniture. Population 1894, 1,324.

CASTALIO, SEBASTIEN, a French theologian; born at Dauphiné in 1515. About 1540 he was invited to Geneva by Calvin, and appointed humanity professor, but having the misfortune afterward to differ from the reformer in religious opinion, he was banished from the city, and went to Basel, where he spent the rest of his life in extreme poverty. Among his various writings may be mentioned *De Hæreticis*, etc., a treatise which argues against the right of the magistrate to punish heretical opinions; a Latin version of the Old and New Testaments; and a posthumous work, in dialogue, on predestination, election, free-will and faith. He died in Basel, Dec. 29, 1563.

CASTANEA, the chestnut tree. See Vol. V, p. 608; ARBORICULTURE, Vol. II, p. 317.

CASTEGGIO, a town of Lombardy, northern Italy, 28 miles S. of Milan. It was an important military position as early as the times of the Gallic and Punic wars. Near here was fought, in 1800, the battle of Montebello, in which Bonaparte defeated the Austrians. Some Roman antiquities still remain, and numerous curious inscriptions and coins have been found. Population, 3,685.

CASTELAR, EMILIO, a Spanish statesman and orator; born at Cadiz, Sept. 8, 1832. He was educated at Madrid, and in 1856 became professor of history and philosophy in its university. He joined the revolutionary republicans, and after the attempted uprising in 1866, being condemned to death, fled to France, but returned in 1868. On the abdication of King Amadeo, brought about in 1873 by his means, he became Minister for Foreign Affairs, and afterward President of the Cortes and President Dictator of the Republic. He resigned in 1874, and again sought France, upon the pronunciamento of General Martinez Campos in favor of Alfonso XII. The same year he resigned the chair of history in the University of Madrid, through disgust at the educational decree promulgated by the Spanish government. He returned to Madrid in 1876, and was again elected to the Cortes. His literary labors include several works of a political and economic character, some autobiographical sketches and romances. He has been a frequent contributor to the prominent magazines, reviews and newspapers. Among his chief works are *La Civilisación* (2d ed. 1865); *Cuestiones Políticas y Sociales* (1870); *Discursos Parlamentarios* (1871); *Historia del Movimiento Republicano en Europa* (1874); *La Cuestión del Oriente* (1876). He contributed, in 1892, a *Life of Columbus* to the *Century Magazine*. Died at Madrid, May 25, 1899.

EMILIO CASTELAR.

CASTELBUONO, a town of central northern Sicily, five miles S. of Cefalù, noted for its mineral springs; also has some manna trade. Pop. 8,945.

CASTEL-GANDOLFO, a village of Italy, the summer residence of the pope. It is situated on a volcanic peak, 14 miles S.E. of Rome. Population, 1,684.

CASTELLAMONTE, a town of Piedmont, northern Italy, 21 miles N. of Turin. It has an old castle, manufactories of earthenware and a trade in the agricultural produce of the district. Population, 6,375.

CASTELLANA, a town of Italy, in the province of Bari, 25 miles S.E. of the city of that name. The

town is occupied mostly with handling the produce of the surrounding country, which is very fertile, producing cotton, oil, wine, almonds, liquorice and live-stock. Population, 9,177.

CASTELLANETA, a town of south Italy, in the province of Lecce, 36 miles S. of Bari. It has several convents and a cathedral. Cotton is grown in the district. Population, 8,834.

CASTELNAU, Francis, Count, a French traveler; born in London, 1812. He traveled among the Canadian lakes, the United States and Mexico from 1837 until 1841, and in 1843 in South America, as director of a French expedition, to make a scientific exploration of central and western Brazil, Bolivia, Peru and the Amazon. He returned to France in 1847, and published his account of the expedition, which was full of information of a geographical and ethnological character. He was subsequently consul at Bahia, Cape Town, and Singapore, and consul-general at Melbourne, Australia. He died at Melbourne, Feb. 4, 1880.

CASTELNUOVO, a seaport town of Dalmatia, southern Austria, situated near the western entrance of the Gulf of Cattaro. It is surrounded by walls, and defended by two forts and a citadel. It has manufactories of brass, and a trade in the produce of the district, which is fertile. Population, 7,369.

CASTELTERMINI, a town in the province of Girgenti, Sicily, 16 miles N. of the city of Girgenti. It has extensive rock-salt and sulphur mines. Population, 9,321.

CASTIGLIONE, Lake of, a lagoon of Tuscany, northern central Italy, in the province of Sienna. It lies to the north of Grosseto, and has a length of about 10 miles, with a breadth of one to three miles. Receiving the waters of the Bruna and other rivers, it discharges its waters by a short canal into the Mediterranean.

CASTILE, a village of Wyoming County, western New York, on the New York, Lake Erie and Western railroad, 9 miles S. of Warsaw. Population 1890, 1,146.

CASTILHO, Antonio Feliciano. See Portugal, Vol. XIX, pp. 557, 558.

CASTILLA, Ramon, a Peruvian soldier; born in Tarapacá, Aug. 30, 1796; died in Tiviliche, May 30, 1867. He was brigadier-general of the army of Peru in 1834; was engaged in several insurrections; overthrew the government of Vivanco, and became President of Peru from 1845 to 1851; overcame his successor and ruled from 1854 to 1862, during which period he abolished slavery and many abuses, but allowed corruption, and after laying down his authority in 1862, was, in 1867, the year of his death, again engaged in insurrection against the Peruvian government.

CASTILLO, Bernal Diaz. See Diaz del Castillo, in these Supplements.

CASTINE, a town of Hancock County, southeastern Maine, situated on the east side of Penobscot Bay, at the mouth of the Penobscot River. It is a port of entry, has an excellent harbor, and is chiefly engaged in ship-building and in the manufacture of cordage, brick and furniture. It is the seat of a state normal school. Population 1890, 987.

CASTING, Common Steel. See Iron and Steel, in these Supplements.

CASTING–VOTE, a vote given by the presiding officer of a deliberative assembly to decide its action on any measure when the members are equally divided or tied. The vote must be authorized by law or under the rules of the assembly, otherwise it cannot be validly cast. Without this authority a tie vote of the assembly is a negative, on the principle that what is not clearly adopted is lost. The Vice-President of the United States, when he is presiding over the Senate, is authorized by the constitution to give a casting-vote when the members are equally divided. A president of a senate, chosen from its members, has no casting-vote, unless it be so provided by the rules. In the 28 states of the Union that choose lieutenant-governors, these officers usually preside over the senate of their respective states, but have only a casting-vote. Speakers of Congress, and usually of the lower houses of legislation, have conferred upon them, by rule, the right to cast a vote decisive of a tie, in addition to their vote as representatives of a constituency. It is the practice of such presiding officer so to decide a tie as to leave the question open for reconsideration under the rules. In the British Parliament there is no casting-vote in the House of Lords, but in the House of Commons the Speaker may use it to resolve a tie. When the presiding officer is chosen from among the members of a deliberative body, he may call some other member temporarily to the chair, and, descending to the floor, participate in the proceedings there; where the presiding officer is such merely *ex officio*, he cannot take part in the deliberations of the body over which he presides.

D. O. Kellogg.

CAST–IRON. See Iron, Vol. XIII, pp. 318–335.

CASTLE, Edmund, (1606–85) an English Oriental scholar. See Polyglott, Vol. XIX. p. 417.

CASTLEFORD, a town in the West Riding of Yorkshire, northern England, on the Aire, 10 miles S.E. of Leeds. It was formerly a Roman station, and is now the seat of extensive glass-works, manufacturing especially large quantities of bottles. Population, 14,143.

CASTLE GARDEN, originally a fort built upon a small island off New York, and connected with it by a drawbridge. After the War of 1812, New York harbor was fortified at other places, and Fort Clinton, as it was called, became unnecessary. It was deeded to the state in 1822, and then leased to a person who turned it into a pleasure-garden. It was here that Jenny Lind made her first appearance in America, under the management of P. T. Barnum (q.v., in these Supplements). When the lease expired, Castle Garden was handed over to the state board of immigration, who used it for an immigration station until 1891. At this time the care of immigrants was taken into the hands of the Federal government, which has transferred the station to Ellis Island. Castle Garden was finally transformed into an aquarium.

CASTLEMAINE, a town of central Victoria, southern Australia, 77 miles N.W. of Melbourne by

rail. The gold-diggings here were among the first discovered in Australia. Population, 6,500.

CASTLE ROCK, town and capital of Douglas County, central Colorado, situated near the famous Castle Rock, on the Atchison, Topeka and Santa Fé and the Denver and Rio Grande railroads, about 30 miles S. of Denver. The chief industries are dairying and cattle-raising. Population 1890, 315.

CASTLEREAGH, LORD. See LONDONDERRY, Vol. XIV, pp. 853–856.

CASTLETON, a town of Rutland County, central western Vermont, on Castleton River, and on the Delaware and Hudson railroad, 10 miles W. of Rutland. There is here a state normal school, and also manufactories of marbleized slate and agricultural implements. Population 1890, 2,396.

CASTOREUM, a substance secreted by the beaver, now chiefly used by perfumers. See BEAVER, Vol. III, p. 476.

CASTRO, a seaport town of Asiatic Turkey, capital of the island of Mitylene, situated on the east coast, about 55 miles N.W. of Smyrna. It is surrounded with walls and defended by a castle. Population, 6,500.

CASTRO, JOSÉ MARIA, Costa Rican statesman; "founder of the republic of Costa Rica"; born in San José, Sept. 1, 1818; vice-president of Costa Rica in 1846; in 1847 president. During his term of office, in 1848, Costa Rica left the confederation of Central American states. He resigned in 1849, but was again elected in 1866, and held office until 1868. He also held many diplomatic commissions.

CASTRO, JUAN, the assumed name of a Cuban poet who was born near Matanzas in 1790, of slave parents, but learned to read and write, and developed marked poetical genius. Some gentlemen purchased his freedom and assisted him in publishing his poems. After his freedom was secured he maintained himself by house-painting, cooking and tailoring. He published an autobiography, which vividly portrays slave-life in Cuba. The finest of his poems, which are in Spanish, is entitled *The Clock That Gains*.

CASTRO, THOMAS, one of the names of Arthur Orton, "the Tichborne Claimant." See TICHBORNE, in these Supplements.

CASTUERA, a town in the western part of the province of Badajoz, Spain, on the Madrid-Saragossa railroad, about 245 miles E. of Lisbon. It is situated on the right bank of the Guadalefra, and has manufactories of brick, earthenware, etc., and a trade in agricultural products. Population, 7,133.

CASUARIIDÆ, a family of birds composed of the cassowaries and emus. They are characterized by a sternum without keel, and rudimentary wings. They inhabit the forests in the Austro-Malayan region.

CASUARINA, a genus of dicotyledonous trees of the family *Casuarinaceæ*. The trees are almost exclusively Australian, having a very peculiar appearance, their branches being long, slender, wiry, drooping and green, jointed with very small scale-like sheaths instead of leaves. They resemble arborescent *Equisetaceæ*. Some of the trees are large and produce timber of excellent quality, often called *beef-wood* from its resemblance in color to raw beef. This curious genus is related to the amentaceous groups, but it has several characters suggestive of a relationship with the gymnosperms. It has recently come prominently into notice through the discovery in it of *chalazogamy* (q.v.), although this character has subsequently been found in several of the amentaceous plants.

CASWELL, ALEXIS, educator; born in Taunton, Massachusetts, Jan. 29, 1799; died in Providence, Rhode Island, Jan. 8, 1877. He was at the head of the class which graduated at Brown University in 1822. The following year he became an instructor in Columbia University, remaining four years, and then becoming pastor of a Baptist church in Halifax, Nova Scotia, having pursued theological studies during his teaching. He taught for a year in Waterville College, was called in 1828 to the First Baptist Church of Providence, Rhode Island, and about this time was called to the chair of mathematics and natural philosophy at Brown University. This he occupied for thirty-five years, resigning in 1863, but was chosen to serve as president of the university five years later, and held this position four years. He founded the alumni association; was connected with Newton Theological Institution; president of the Baptist Missionary Union for two years; a trustee, and for two years the president, of the Rhode Island Hospital; and connected with various other literary and scientific associations. He published *Lectures on Astronomy; Memoirs of John Barstow*; and *Results of Meteorological Observations at Providence, Rhode Island, from 1831 to 1876*.

CASWELL, RICHARD, soldier; born in Maryland, Aug. 3, 1729; died in Fayetteville, North Carolina, Nov. 20, 1789. He was a lawyer; was in the colonial assembly from 1754 to 1771; a delegate to Congress (1774–75); governor of North Carolina from 1777 to 1779; and was engaged in the war of the Revolution, reaching the rank of major-general. He became comptroller-general in 1782, governor from 1784 to 1786, Senator in 1789, and member and presiding officer of the convention which ratified the Federal constitution in 1789.

CATABOLISM, a term in physiological botany applied to all those chemical processes in a plant which lead to the formation of simple substances from more complex ones. Such processes are associated with the conversion of potential into kinetic energy; therefore it is through its catabolism that a plant liberates the energy which expresses itself in growth, movement, etc. Catabolism is carried on either by the protoplasm itself, or by substances which it produces, known as *enzymes*. In the former case the changes are usually associated with the absorption of O and the evolution of CO^2. This gaseous interchange, known as *respiration*, is taken as the indication of catabolic activity.

CATABROSA, a genus of grasses formerly included in *Aira*. *Catabrosa aquatica* grows in very moist situations, and is only cultivated in irrigated meadows or on the banks of rivers subject to be overflowed by high tides. Its foliage is peculiarly

sweet and much relished by cattle. Its foliage and seeds also afford much food to water-fowl and to some kinds of fish, particularly carp. Its leaves often float, and its stalks seldom rise more than a foot or 15 inches above the surface of the water. It abounds throughout Europe and in the torrid regions of South America.

CATACAUSTICS, the reflected rays of light in caustic curves. See CAUSTIC, in these Supplements.

CATALAN, a variety of Romance language. See SPAIN, Vol. XXII, pp. 347–349.

CATALANI, ANGELICA, an Italian singer; born at Sinigaglia, Italy, in 1779; died in Paris, June 13, 1849. She was educated in the convent of St. Lucien, near Rome; made her first public appearance at Venice in her sixteenth year, and experienced a succession of triumphs in every country in Europe for more than thirty years. While in Portugal in 1804, she married a member of the French embassy, M. Valabrègue. In 1830 she purchased a villa in Florence, where she gave free instructions to girls who had a talent for singing. In 1849 she repaired with her two daughters to Paris, where she died of cholera.

CATALAUNIAN, the ancient name of the wide plain surrounding Chalons-sur-Marne, in the old province of Champagne, France, celebrated as the field of battle where the West Goths and the forces under the Roman general Aëtius gained a victory over Attila, A.D. 451. A weird tradition tells that three days after the fight the ghosts of the fallen myriads appeared on the plain, and renewed the conflict.

CATALINA, a port of entry on the northern coast of Trinity Bay, 60 miles N.N.W. of St. John's, Newfoundland. It has a fine harbor, though difficult of approach, and a lighthouse. Population, 1,300.

CATALPA, a genus of hardy trees, order *Bignoniaceæ*, of which two species (*C. bignonioides* and *C. speciosa*) are natives of the United States, and are common in cultivation as ornamental trees. The catalpa has large simple leaves, terminal panicles of showy flowers, and long pods with winged seeds. Its wood is light and soft, but exceedingly durable, and is used for fence-posts, railway sleepers, etc. *C. longissima* of the West Indies yields excellent timber known as French oak, and the bark is a source of tannin. The Japanese catalpas are small and unimportant.

CATALYSIS, a term applied in chemical physics to a force supposed to be exerted by one substance upon a second, whereby the latter is subjected to change or decomposition, while the former, or acting substance, remains comparatively unaltered, and does not combine with it. See ALCOHOL, Vol. I, p. 470.

CATAMARAN is a craft formed of three logs lashed together, the middle one serving as a keel, and the other two for the sides; sometimes rigged with a sail. These simple vessels are used by the natives of Madras to maintain communication between ships and the shore, ordinary boats being rendered unsafe by the surf. By the adoption of a similar construction on a larger scale, as of two boats lashed together and decked over, some of the catamarans are made large and strong enough to carry goods, and even artillery. Catamarans are also used along the seashore of West Indies, and on the coasts of South America.

CATAMENIA. See *Menstruation*, under REPRODUCTION, Vol. XX, p. 408.

CATAMOUNT. Same as PUMA, Vol. XX, pp. 104, 105.

CATAPLASM, an application to diseased or painful parts, for the purpose of promoting suppuration, relieving pain, and stimulating or soothing the skin, according to circumstances. A cataplasm may be composed of any moist pulpy substance of sufficient consistence to retain the water without soaking through the thin muslin covering in which it is wrapped. The flaxseed poultice is the most easily made, and is the most satisfactory of all soothing applications.

CATARACT. See OPHTHALMOLOGY, Vol. XVII, p. 782.

CATARACTS, portions of a stream where the decline or descent is abrupt and sudden, and the water falls or leaps to the lower part. (See *Waterfalls*, under GEOLOGY, Vol. X, p. 276.) The more notable falls in the United States are as follows:

Niagara, the most celebrated cataract in the world, is on Niagara River, 22 miles north of Lake Erie, and 14 miles south of Lake Ontario. Goat Island separates the falls into the American, 164 feet high, and the Canadian, or Horseshoe, 158 feet high.

Trenton Falls are on West Canada Creek, 15 miles northwest of Utica, New York. The falls consists of a series of six cascades and cataracts, having an aggregate descent of 312 feet in two miles.

The Waterfalls of New York State are a noteworthy feature of its natural scenery. Baker's Falls are 70 feet high; Birmingham, 70; Black Chasm, 300; Buttermilk, 100; Carthage, 75; Cauterskill, 180, 80 and 40; Claverack, 90; Cohoes, 70; Corinth, 60; Fawn-leap, 30; Genesee, 96, 25 and 84; Glen's, 60; Hadley's, 60; Haines's, 150, 80 and 60; Hoosac, 40; Ithaca, 160; Little, 44; Lodi, 125; Lyon's, 63; Luzerne, 25; Portage, 70, 110 and 90; Roaring Brook, 500; Sawkill, 80; Split Rock, 100; Taghkanic, 215; Tekaharawa, 100; Ticonderoga, 100 and 30. Piercefield and Rainbow falls in the Adirondacks, Shelving Rock Fall near Lake George, and the falls in Watkins Glens, are pretty cascades.

Yosemite, the highest waterfall in the world, is in Mariposa County, California, where the Yosemite Creek plunges 2,600 feet into the Yosemite Valley. There is first a clear fall of 1,500 feet, then a series of cascades aggregating 600 to 700 feet, and finally a plunge of 400 feet to the base of the precipice. In the same valley are the beautiful Bridal Veil Fall, 900 feet; Virgin's Tears, 1,000; Illilouette, 600; Vernal, 400; and Nevada, 600.

Other Famous Falls in the United States are the Austin, in Maine, 100 feet high; Belden's, Vermont, 37; Bellows, New Hampshire and Vermont, 40; Berlin, New Hampshire, 80; Carp, Michigan, 200; Chattahoochee, Georgia, 110; Clifton, Ohio, 50; Crystal Cascade, New Hampshire, 80; Dead River.

Michigan, 96; Georgiana, New Hampshire, 80 and 80; Glen Ellis, New Hampshire, 80; Great, Nebraska, 88; Housatonic, Connecticut, 60; Lewiston, Maine, 100; Minnehaha, Minnesota, 60; Passaic, New Jersey, 70; Potomac, Virginia, 76; Puncheon Run Cascades, Virginia, 1,800; Rumford, Maine, 150; St. Anthony, Minnesota, 18; Saco, Maine, 72; Shelburne, Massachusetts, 150; Shoshone, Idaho, 200; Silver Cascade, New Hampshire, 800; Sylvan Glade, New Hampshire, 174; Tallulah Falls and Rapids, Georgia, 86; Willamette, Oregon, 40; Yellowstone, Montana, 140 and 360.

CATARRHINA, a name applied collectively to the apes and monkeys of the Old World, which are characterized by having the nostrils approximated and turned downward. The term is opposed to *Platyrrhina*.

CATASAUQUA, a railroad town of Lehigh County, eastern central Pennsylvania, situated on the Lehigh River, and on the Catasauqua and Vogelsville, the Central of New Jersey and the Lehigh Valley railroads, three miles N. of Allentown. It contains blast-furnaces, rolling-mills, machine-shops and manufactories of fire-brick and railroad cars. Population 1890, 3,704.

CATAWBA OR GREAT CATAWBA, a river of North Carolina, 250 miles in length. It rises in McDowell County, in the western part of the state, flows eastward for about 75 miles, then southward and enters South Carolina at Rocky Mount, below which place it is called the Wateree River.

CATAWBA WINE, a light sparkling wine made from the Catawba grape (*Vitis labrusca*). The Catawba grape was said to have been first discovered in 1801 near the Catawba River, in North Carolina. It is most extensively cultivated in Ohio, especially in the vicinity of Cincinnati. The first wine from it was made by Nicholas Longworth of Cincinnati. A large quantity of this wine is consumed in the United States, the most of it made in Ohio. See WINE, Vol. XXIV, p. 611.

CATAWISSA, a village of Columbia County, eastern central Pennsylvania, on the Susquehanna River, four miles S. of Bloomsburg, and on the Delaware, Lackawanna and Western, the Pennsylvania, and the Philadelphia and Reading railroads. It has paper and fiber factories, a foundry, and a shoe factory; it has efficient water-works. Population 1890, 1,809.

CAT-BIRD. See MOCKING-BIRD, Vol. XVI, p. 541.

CATCHFLY, a common name of several plants of the family *Caryophyllaceæ*, notably the genus *Silene*, which, being clammy, in consequence of a glandular excretion on the calyx, on the joints of the stem, etc., often prove fatal to insects settling upon them.

CATCHPOLE OR CATCHPOLL, in England, a sheriff's officer, or bailiff, whose duty it is to make arrests. In various places a long pole was in use for catching or holding criminals by the neck, having at the end of it an iron collar with a V-shaped opening, occasionally armed with spikes on the inside. The catchpole was also used by soldiers for unhorsing knights.

CATE, WILLIAM HENDERSON, a lawyer and Congressman; born in Rutherford County, Tennessee, Nov. 11, 1839. He graduated from the university at Knoxville, Tennessee, in 1857; was a teacher in the West and South, and served in the Confederate army during the war of the Rebellion. He settled at Jonesboro, Arkansas, in 1865, and entered the profession of law in 1866. In politics he was a Democrat, and was elected a member of the state legislatures of 1871 and 1873. He was prosecuting attorney of the second circuit in 1878, and elected judge of that circuit in 1884. He was declared elected a Democratic representative from the first Congressional district of Arkansas to the Fifty-first Congress, but the House of Representatives decided that he was not entitled to the seat. He was elected from the same district to the Fifty-second Congress.

CATENÆ, commentaries. See HERMENEUTICS, Vol. XI, p. 746.

CATENARY PROBLEM. See MECHANICS, Vol. XV, pp. 738–743.

CATENIPORA OR HALYSITES, a genus of fossil corals peculiar to Palæozoic strata. See HALYSITES, in these Supplements.

CATERPILLAR, the larva of a lepidopterous or scaly winged insect. See BUTTERFLIES, Vol. IV, pp. 593, 594.

CATESBY, MARK, naturalist; born about 1679, in London; died there, Dec. 23, 1749. He traveled in North America from 1710 to 1719, and from 1722 to 1726, and published *Natural History of Carolina, Florida and the Bahama Islands* (2 vols., 1731–43); *Hortus Britanno-Americanus;* and a work on the fishes, reptiles and insects of the Isle of Providence.

CATESBY, ROBERT, a Northamptonshire Roman Catholic; born in 1573, of good fortune and lineage; sixth in descent from Richard III's Catesby, who was hanged three days after Bosworth. He was the originator of the Gunpowder Plot of 1604. When Fawkes was arrested, Catesby, with the remaining conspirators, made a resistance, and in the fight which ensued he was killed at Holbeach House, Nov. 8, 1605. See FAWKES, Vol. IX, p. 57.

CATFISH. See SILURIDÆ, Vol. XXII, p. 68.

CATHA, a genus of plants belonging to the natural order *Celastraceæ*, chiefly natives of Africa. *C. edulis*, the *khat* or *kafta* of the Arabs, is a shrub highly valued by them, as its leaves and twigs are used in the preparation of a beverage possessing properties analogous to those of tea and coffee.

CATHARI, a name equivalent in sense to Puritans; applied to various bodies of early Christians in the seventh century, especially to the Novatians. The term was often used ironically for those who pretended to live purer lives than their neighbors. The sect probably originated among the Slavs in southern Macedonia. They were known in Italy during the tenth century as Bogomili; in the twelfth century as Abanensians and Concorezenians; attained their greatest number as Paulians in the fourteenth century. The members renounced marriage and animal food. They disappeared in the last half of the fourteenth century.

CATHARINE. See CATHERINE, in these Supplements.

CATHARINE ISLANDS, a name once given to the ALEUTIAN ISLANDS; q.v., Vol. I, p. 420.

CATHARTICS, a name, originally, for all medicines supposed to purify the system from the matter of disease, which was generally presumed by the ancients to exist in all cases of fever and acute diseases and to require to be separated or thrown off by the different excretions of the body. The term is now used, however, for purgatives, medicines used in cleansing the bowels by promoting the evacuation of excrement and to remove irritating matters, to produce counter-irritation and an increased secretion from a mucous surface to relieve distant parts, as the head. The principal cathartics are aloes, colocynth, rhubarb, scammony, jalap, senna, Epsom and other salts.

CATHARTIDÆ. See VULTURE, Vol. XXIV, p. 301.

CATHARTINE OR BITTER OF SENNA, the essential principle in senna, which possesses laxative or purgative properties. It can be isolated as a yellowish red uncrystallizable solid, which is deliquescent, soluble in water and alcohol, but insoluble in ether. It has a very bitter, nauseous taste, and a characteristic odor.

CATHAY. See CHINA, Vol. V. pp. 627–629.

CATHCART, WILLIAM SHAW, EARL OF, a British general and diplomatist; son of the ninth Baron Cathcart of Cathcart, Renfrewshire; born Sept. 17, 1755; died June 17, 1843. He was educated at Eton and Glasgow, and admitted an advocate in 1773. He entered the army in 1774, took a prominent part in the American war, and fought with distinction in Flanders and North Germany. In 1803 he was made commander-in-chief in Ireland. In 1807 he commanded the land forces co-operating with the fleet in the attack on Copenhagen, and for his services was made a British peer, with the title of viscount, and received a vote of thanks from both houses of Parliament. In 1814 he was raised to the rank of earl.

CATHELINEAU, JACQUES, general of the army in La Vendée, in the west of France. He was born at Pin-en-Mauges, Jan. 5, 1759; died at St. Florent, July 11, 1793. Horrified at the atrocities and despotic acts of the convention, he placed himself in opposition to it, and soon collected around him a body of loyal peasantry, whom he led against the republicans, defeating them in several conflicts. After the victory of Saumur, he was appointed commander-in-chief. He died from the effect of a wound received while making an attack upon Nantes.

CATHERINE DE RICCI, SAINT. See Vol. V, p. 229.

CATHERINE OF GENOA, SAINT. See Vol. V, p. 229.

CATHERINE OF SIENA, SAINT. See Vol. V, p. 229.

CATHERINE HOWARD, a queen of England, fifth wife of Henry VIII. She was a grand-daughter of the second Duke of Norfolk; born probably in 1521; was married to the king, in 1540, at the suggestion of the Bishop of Winchester. She was accused of immoral conduct and was beheaded in 1542.

CATHERINE PARR, a queen of England, sixth wife of Henry VIII. She was the daughter of Sir Thomas Parr, and was born in 1512. She was twice married before her marriage with the king in 1543. She was a woman of considerable learning. She persuaded the king to restore the right of succession to his daughters. Upon the death of Henry, she married, in 1547, Sir Thomas Seymour, but died the following year.

CATHETER, an instrument used in surgery for insertion into canals and passages of the body, and for conveying fluids or air to or from the parts of the body with which these canals connect. It is used principally for drawing off urine from the bladder, through insertion in the urethra. The lung catheter is described in RESPIRATION, Vol. XX, p. 481, note. The catheter is generally made of silver, although other metals are at times used. It consists of a hollow tube varying in length according to the purpose for which it is designed.

CATHODE AND CATHODE RAYS. See ELECTRICITY, § 95, in these Supplements.

CATHOLIC APOSTOLIC CHRISTIANS. See GERMAN CATHOLICS, Vol. X, pp. 444, 445.

CATHOLIC BENEFIT SOCIETIES. See BENEFIT SOCIETIES, in these Supplements.

CATHOLIC EMANCIPATION, in England the repeal, in 1829, of the laws which restrained Roman Catholics from enjoying civil rights and the privilege of disposing of their own property. Up to 1780, according to the law, it was high treason for a native of the kingdom to perform the rites of the Roman Catholic Church, and Catholics were debarred from purchasing land. Gradually one law after another was repealed, until the Duke of Wellington moved the repeal of all anti-Catholic laws; although a few clauses continue in force, among them being the one prohibiting a Catholic priest from holding a seat in the House of Commons.

CATHOLIC EPISTLES, the name given, according to Clemens Alexandrinus, to certain epistles addressed not to any particular churches or persons. They were seven epistles of the New Testament: the epistle of James; the three epistles of John; the one to Jude; and the two of Peter. The term was in distinction from the fourteen epistles of Paul.

CATHOLIC LEAGUE, in France (see FRANCE, Vol. IX, pp. 562, 564); in Germany (see GERMANY, Vol. X, p. 497).

CATHOLIC PAROCHIAL SCHOOLS. See SCHOOLS, PRIVATE, in these Supplements.

CATHOLIC UNIVERSITY OF AMERICA, at Washington, District of Columbia; the national university of the church; formally sanctioned by Leo XIII in 1887, but not open for students until 1889. The first gift for the endowment was given in 1884 by Miss Mary Caldwell, and consisted of $300,000. Numerous other benefactions have been received. It is intended that this shall be the post-graduate school of the church. Bishop Keane was rector from 1886 to 1896. In 1895 there were 30 instructors, 180 students, and 18,000 volumes in the library.

CATHOLICOS, the title of the patriarchs or chief ecclesiastics in the hierarchy of the Armenian

Church, and of the Christians in Georgia and Mingrelia. The catholicos ordains bishops and consecrates the holy oil used in religious ceremonies.

CATIPUNAN. See PHILIPPINE ISLANDS, these Supplements, pp. 2365*a*–2365*b*.

CATKIN, in botany, a spike of numerous small unisexual flowers, which are protected by prominent scale-like bracts. Examples are found in the willow, oak, alder, birch, etc. Also called *ament*.

CATLETTSBURG, village and capital of Boyd Co., Ky., a railroad junction on the Chesapeake and Ohio railroad, and on the Ohio river, at the mouth of the Big Sandy River. Has a state normal school, a large lumber trade, and several factories. Pop. 1890, 1,374.

CATMINT OR CATNIP (*Nepeta cataria*), a plant of the family *Labiatæ*, widely diffused throughout Europe, Asia, and North America; has erect stems, two or three feet high, dense whorls of many whitish flowers, and stalked, heart-shaped, velvety leaves, whitish and downy beneath, and its fragrance is very attractive to cats. Also used as a domestic remedy.

CATOCHE, CAPE, the northeastern extremity of Yucatan, Central America. Lat. 21°36′ N., long. 87° 6′ W. Here the Spaniards first landed in America.

CATON, JOHN DEAN, an American jurist; born in Monroe Co., N. Y., March 19, 1812; died in Chicago, July 30, 1895. He went to Chicago in 1833, and was admitted to the bar of that city. In 1834 he was elected a justice of the peace; in 1842 a justice of the supreme court of the state; and in 1855 chief justice of that court. He resigned this position in 1864, and spent the remainder of his life in travel and study. He was known as a naturalist, and some of his works are of value, including *Antelope and Deer of America*, and *Miscellanies*.

CATOPTRICS, that division of geometrical optics which treats of the phenomena of light incident upon the surface of bodies, and reflected therefrom. As applied to illumination, see LIGHTHOUSE, Vol. XIV, pp. 618–20.

CATORCE, a silver-mining city in San Luiz state, Mexico, with steep and winding streets; has a fine cathedral. Population varies from 8,000 to 40,000, according to the yield of the mines.

CATOSTOMIDÆ, the family of fishes composed of the suckers and their allies, the carps, buffalo-fish, etc. There are about 60 described species, mostly from eastern North America. Two are found in Asia. They are all of little value as food.

CATRON, JOHN, jurist; born in Wythe County, Virginia, in 1778; died in Nashville, Tennessee, May 30, 1865. He practiced law in Tennessee; served under General Jackson in the War of 1812; was elected state attorney; chosen a supreme court judge, and was chief justice from 1830 to 1836. In 1837 he became associate justice of the United States supreme court, retaining the office up to his death. Judge Catron was a Democrat, a fervent Unionist, and for his opinions on secession was compelled to leave the state for a time.

CAT'S-EYE, a variety of precious stone, which, when cut in a particular form, produces an opalescence. The finer and more valuable stone is a variety of chrysoberyl, q.v., in article on MINERALOGY, Vol. XVI, p. 386; also under QUARTZ, p. 389.

CATSKILL, a village and the capital of Greene County, southeastern New York, situated on the right bank of the Hudson and on the West Shore railroad, 35 miles below Albany. A railroad runs from Catskill Landing, a mile below, on the Hudson, through Catskill up into Catskill Mountains, for summer visitors. It has an academy and various factories, including woolen and paper mills, stoneyards, and icehouses. Pop. 1890, 4,920.

CATSKILL GROUP, in geology. See GEOLOGY, Vol. X, p. 345.

CATTAIL, a common name applied to the species of *Typha*, a reed-like marshy ground genus of the *Typhaceæ*, with flag-like leaves and tall stem terminated by a dense cylindrical spike; often called "cattail-flag." The common grass *Phleum pratense* (timothy) is often called "cattail grass."

CATTEGAT OR KATTEGAT, a strait between Sweden and Denmark. See BALTIC, Vol. III, p. 294.

CATTELL, ALEXANDER GILMORE, Senator and financier; born in Salem, New Jersey, Feb. 12, 1816; died in Jamestown, New York, April 8, 1894. He was elected to the legislature in 1840; moved to Philadelphia, but maintained his residence in New Jersey; was elected to the United States Senate from New Jersey in 1866; served for two years as a civil service commissioner, being on the first commission appointed; was financial agent to London for the government (1873–74); was instrumental in bringing about a settlement of the Alabama claims, and was engaged in important financial transactions.

CATTELL, WILLIAM CASSIDY, brother of the preceding; an educator; born in Salem, N. J., Aug. 30, 1827; graduated at Princeton College and Theological Seminary; became professor of Latin and Greek in Lafayette College in 1860; and for three years was pastor of the Pine Street Presbyterian Church at Harrisburg, Pa. In 1863–83 he was president of Lafayette College, in which capacity he made extensive improvements. He was a director of Princeton Theological Seminary, and for several years corresponding secretary of the Presbyterian Board of Ministerial Relief. Died at Easton, Pa., Feb. 11, 1898.

CATTLE, in the United States. See AGRICULTURE, in these Supplements.

CATTLE-PLAGUE. See MURRAIN, Vol. XVII, pp. 59–60.

CATTLE TRAFFIC. See RAILROADS, in these Supplements.

CATTLEYA, a genus of tropical American orchids, noted for the size and brilliant coloration of their flowers. Numerous species are great favorites in cultivation, and are all epiphytic.

CATTY, Chinese weight. See CANTON, Vol. V, p. 38.

CATULUS, QUINTUS LUTATIUS, Roman general, and consul with Caius Marius IV in 102 B. C.; proconsul the next year, and with Marius gained a decisive victory over the Cimbri at Vercellæ. Catulus claimed the honor of the victory, but Marius was given the credit at Rome. He was

proscribed in 87 B.C., and put an end to his own life by inhaling the gases of a charcoal fire. He was versed in literature, and was the author of numerous lyrical poems and epigrams.

CAUB, a town of Nassau, North Germany, on the right bank of the Rhine, 21 miles N.W. of Weisbaden. It has underground slate-quarries. It is celebrated as the place where Blücher crossed the Rhine with his army in 1814.

CAUCA, a river and province. See COLOMBIA, Vol. VI, pp. 153, 156.

CAUCASIAN RACE. See ANTHROPOLOGY, Vol. II, p. 113; GEORGIA, Vol. X, p. 433.

CAUCHON, JOSEPH EDWARD, Canadian author and statesman; born in St. Roch's, Quebec, Dec. 31, 1816; died in Whitewood, Northwest Territory, Feb. 23, 1885. He founded, in 1842, *Le Journal de Québec*, which he conducted until his death. From 1844 till 1867 he represented the county of Montmorency in the Quebec assembly. Under the MacNab-Taché administration he held for two years the office of commissioner to the crown, and was at the same time member of the Executive Council. During the Cartier-Macdonald *régime*, Mr. Cauchon was Commissioner of Public Works. He was Speaker of the Senate from 1867 to 1872, president of the Privy Council of Canada from 1875 to 1877, and Minister of Inland Revenue till 1877, at which time he became governor of Manitoba. He published *The Projected Union of the Provinces of British North America* in 1858, and in 1865 *The Union of the Provinces of British North America.*

CAUCHY, AUGUSTIN LOUIS, mathematician; born in Paris, Aug. 21, 1789; died May 23, 1857. He published in 1815 a *Mémoire sur la Théorie des Ondes*, which was afterward made the basis of the undulatory theory of light. Between 1820 and 1830 he wrote several important treatises. From 1848 to 1852 he was professor of astronomy at Paris, but refused the oath of allegiance to Napoleon III, and subsequently lived in retirement. See ALGEBRA, Vol. I, p. 515.

CAUCUS, a meeting for adopting a plan of action in any future business or meeting. The term is generally used in relation to political parties and the working of those parties. It may be, and is, used in speaking of any preliminary gathering of purely business organizations, as, for instance, the board of directors of a large corporation in which the number of members is so large that they are likely to divide on some important question, and it is desirable that each side shall be prepared to follow a concerted line of action. In politics the caucus may be a meeting of citizens to nominate some one of their number for a town office, or to elect delegates to some larger convention. Such a caucus often is composed of citizens, irrespective of political party. The members of a political party may gather to nominate their candidates and outline their course of action. A caucus is frequently held in legislative bodies, by the members of one side or the other, to agree upon leaders and tactics. The action of a caucus is generally binding upon its members. It is semi-secret in its nature. The word is said by some to have originated from the Indian *cau-cau-as-u*, defined by Trumbull as "one who advises, urges, encourages." The generally accepted derivation, however, is that it is a corruption of the word *calkhouse*. During pre-revolutionary and Revolutionary times, secret meetings were held by the calkers of ships, and others, in the calkhouses of Boston, to devise means of resisting the British oppression, and, in time, to govern the town. Secret meetings of influential citizens were frequently held for political purposes. To these meetings the term *calkhouse*, or *cauk-hus*, was applied in ridicule. This application gradually spread until it has come into general use. Of late years, in the larger cities of England, the caucus, called by that name, has been introduced. John Adams first makes use of the word in his diary, under the date of February, 1763. The large nominating conventions of the United States are, in every sense of the word, caucuses. The caucus is regulated by law in some states, owing to the abuse of its powers by a few. Where it is so regulated it is called a *primary*, and the voting is done by ballot, and a system of registration is used.

CAUL, a thin membrane which occasionally is around the head of a child at its birth. It is a part of the amnion which envelops the fœtus in the womb, and remains on the head of the child only when the amnion is broken in an unusual place. It was thought to bring luck not only to the child, but also to the person who gained possession of it. It was especially sought after by sailors on account of the belief that it was a sure preservative from drowning. On account of this superstitious value, it was frequently sold at a high price.

CAULAINCOURT, ARMAND AUGUSTIN LOUIS DE, Duke of Vicenza, a French statesman; born at Caulaincourt, Dec. 9, 1772; died at Paris, Feb. 19, 1827. He entered the army at the age of 15, rapidly attained promotion, and, as colonel of a regiment of carbineers, distinguished himself in the campaign of 1800. He was made a general of division in 1805, and shortly after created Duke of Vicenza. In 1807 he was appointed ambassador at St. Petersburg. Disputes having arisen between Alexander and Napoleon, Caulaincourt endeavored to restore amity and prevent war; but his proposals being rejected, he resigned his post in 1811, and accepted an appointment in the army of Spain. He was made Minister for Foreign Affairs, and in this capacity attended the congress at Chatillon in 1814.

CAULIFLOWER. See CABBAGE, Vol. IV, p. 618; HORTICULTURE, Vol. XII, p. 281.

CAULONIA OR CAULON, now Castelvetere, a town once called Aulon, in Calabria. It was founded by the Achæans. It was destroyed and rebuilt three times, being destroyed the last time in the second Punic war. The Delphian Apollo was worshiped there.

CAULOPTERIS, a generic name for the stems of certain fossil tree-ferns, found in the Devonian

and Carboniferous measures. They are hollow, and covered with markings similar to the leaf-scars on recent tree-ferns.

CAURA, a considerable river of Venezuelan Guiana. It rises among the Sierras of the southern frontier, and flows northwest to the Orinoco. Length, about 150 miles.

CAUS, CAULX OR CAULS, SALOMON DE, French engineer; born at Dieppe in 1576; died in Paris, June 6, 1626. He spent the greater part of his life in England and Germany. He was in the service of the Prince of Wales in 1612, and of the elector palatine at Heidelberg from 1614 to 1620. Returning to France in 1623, he became engineer and architect to the king. His *Raisons des Forces Mouvantes*, etc., published at Frankfort in 1615, contained a description of an apparatus for forcing up water by a steam-fountain, differing only in one detail from that of Della Porta. That difference was, that he had one vessel serve both as boiler and as displacement chamber, instead of Della Porta's separate chambers. (See STEAM-ENGINE, Vol. XXII, p. 473.) There is no reason to suppose that the apparatus was ever constructed; but, on the strength of the description, Arago has claimed for De Caus the invention of the steam-engine.

CAUSE, in metaphysic, is generally understood to be that by which something known as the effect is produced, and without which it could not have existed. Causes are divided by Aristotle into four classes: the material, formal, efficient and final. To these is added the exemplary by Plato. The first is that of which anything is made; as, the brass or marble of a statue. The formal is the form, idea, pattern, of a thing; as, the artistic idea of the statue. The efficient is the power acting to produce the work; as, the mechanical labor employed in producing the statue. The final is that which led to the production, the end or motive in view in producing the statue. The cause does not precede the effect, but is in conjunction with it. There can be no cause without an effect, nor can there be an effect without a cause. See METAPHYSIC, Vol. XVI, pp. 79 et seq.

CAUSE CÉLÈBRE, a convenient French term for a specially interesting and important legal trial, criminal or civil, such as the Douglas cause (1769–71), the Dred Scott case in the United States (1856), the Tichborne case (1871–74), (q.v., in these Supplements). There is a great French collection of *Causes Célèbres et Interessantes* (22 vols., 1737–45), by Gayot de Pitaval, with modern continuations.

CAUSE OF ACTION is a matter for which a suit or action in law or chancery may be maintained. If a suit is brought upon a claim, and the plaintiff cannot maintain it in that or any other form, he is said to have no cause of action. A cause of action accrues to any person when that person first has the right to bring and maintain a suit thereon.

CAUSERIE, a name applied to a somewhat short and informal essay on any subject in a newspaper or magazine. More familiar in manner and slighter in structure than the formal essay as usually understood, it is an excellent medium for a writer whose personality interests the reader as much as the value of his thoughts. The name owes its literary currency mainly to the famous *Causeries du Lundi* of Sainte-Beuve.

CAUSSIN DE PERCEVAL. See PERCEVAL, AMAND PIERRE CAUSSIN DE, Vol. XVIII, p. 521.

CAUSTIC, in medicine and in chemistry, the term applied to such substances as exert a corroding or disintegrating action on the skin and flesh. Lunar caustic is nitrate of silver. The hydrates of potassium and sodium are known as caustic potash and caustic soda. Certain acids and haloids have the same effect, owing to their affinity for or decomposition of water in the tissues. In mathematics a caustic is a curve or envelope of rays produced by light reflected from or refracted by a curved surface. It is so called because here the heat-rays are most converged and strong. The curve formed by reflected rays is called *catacaustic;* that formed by refracted rays, *diacaustic.* The caustic of a parabolic mirror is formed by rays reflected parallel with the axis of the parabola. Hence this form of mirror gives light its greatest penetration, and is used for headlights and in lighthouses. See LIGHT, Vol. XIV, p. 589.

CAUTERETS, a fashionable French watering-place, in the department of Hautes-Pyrénées, southern France, situated 3,250 feet above sea-level, in the valley of the Laverdan, 42 miles S.E. of Pau. The permanent population is less than 2,000, but it is annually swelled in summer by from 15,000 to 20,000 visitors, for whose accommodation numerous sumptuous hotels and bathing establishments have been built. It is a good center and guide-station for ascents among the Pyrenees. The sulphur springs, 25 in number, have been known from Roman times, though their modern reputation dates from the sixteenth century, when Margaret, sister of Francis I, held her literary court and wrote much of her *Heptameron* at Cauterets.

CAUTERY, in medicine, a term used of any substance which burns the tissues. It is used to prevent bleeding and to keep diseases from spreading. The *actual* cautery is an instrument with a head or blade of steel, iron or platinum, which is heated in a fire or spirit-lamp. In the *thermo-cautery* (or Paquelin's cautery, from its inventor), the head or blade is made of hollow platinum, so arranged that a flame of benzol can be kept burning in its interior. The *galvano-cautery* consists essentially of a platinum wire, which can be heated by passing a strong galvanic current through it. The *electro-cautery* consists of a loop of fine platinum wire mounted in a rubber handle, through which connecting wires pass. These wires are led to a battery, the current from which follows the wires, and keeps the platinum loop white-hot.

CAUVERY OR CAVERY, a river of India. See KAVERI, Vol. XIV, p. 19.

CAVAIGNAC, JACQUES MARIE EUGÈNE GODE-

FROY, French statesman and writer; son of Louis Eugène Cavaignac (q.v., Vol. V, p. 259); born May 22, 1853; took honors in his studies at the Lycées Charlemagne and Louis le Grand; served as a volunteer in the Franco-Prussian war and was rewarded for special services. After a few years spent in study, he was elected to the Chamber of Deputies in 1882. He was chosen Under-Secretary of State in 1885, and Minister of Marine in 1892. He was an active participant in the Panama investigation of 1892–93 as leader of the Conservative Republicans. He published *The Railroads and the State* and *The Formation of Modern Prussia.*

CAVALCASELLE, GIOVANNI BATTISTA, Italian art critic; born at Legnago, Jan. 22, 1820; early visited the art centers of Italy, and in 1846 went to Germany, where he met J. A. Crowe, with whom he returned to Italy. Banished for his share in the revolution of 1848, he accompanied Crowe to London, where their first joint work, *Early Flemish Painters* (1857; 3d ed. 1879), was published. Cavalcaselle returned to Italy in 1858, and in 1861 commenced, with Crowe, the *History of Painting in Italy* (London; 5 vols., 1864–71). Other joint works are *Titian* (1876) and *Raphael* (1883). Cavalcaselle became head of the art department in the Ministry of Public Instruction at Rome, inspector of the National Museum at Florence, and of the Museum of Antiquities at Rome. Died in Rome, Nov., 1897.

CAVALIER, in fortification, is a defense-work constructed on the *terre-plein*, or level ground of the bastion, and behind another fortification over which it has a command of fire. It is used to command any rising ground held by the enemy within cannon-shot.

CAVALIER, a horseman; a knight. In 1641 the term *cavaliers* was applied to the partisans of Charles I of England, in opposition to the Roundheads, or supporters of the Parliament.

CAVALLI, a fish. See HORSE-MACKEREL, Vol. XII, p. 206.

CAVE, ALFRED, Congregational clergyman and theological writer; born in London, England, Aug. 29, 1847; in 1872 was graduated at London University; elected professor of Hebrew and philosophy at Hackney College, London, in 1880, and principal and professor of theology in 1881. He published *The Scriptural Doctrine of Sacrifice; An Introduction to Theology;* and *The Inspiration of the Old Testament.*

CAVEAT, a formal warning entered in the books of a court or a public office, that no step shall be taken in a particular matter without notice to the person lodging the caveat, so that he may appear and object. Thus caveats are frequently entered at the patent-office to prevent the unopposed granting of letters patent.

CAVEAT EMPTOR, a rule of sales concerning public property. The expression is from the Roman law, and means "let the buyer beware," or that he takes the responsibility as to the quality of the goods purchased. It does not relieve the seller from making a good title, or from the consequences of fraud. See SALE, Vol. XXI, p. 208.

CAVE-DWELLERS. See CAVE, Vol. V, pp. 265–71; ANTHROPOLOGY, Vol. II, p. 115; TROGLODYTES, Vol. XXIII, p. 583.

CAVELIER, PIERRE-JULES, French sculptor; born in Paris, Aug. 30, 1814; studied under d'Angers and Delaroche; obtained a grand prize in 1842 for the work *Diomède Enlevant le Palladium.* He was made a member of the Institute and an officer of the Legion of Honor. His best-known works are *Pénélope Endormie; La Vérité; Le Néophyte;* and *La Sculpture* (1891). Died in Paris, Jan. 28, 1894.

CAVENDISH, FREDERICK CHARLES, LORD, younger son of the seventh Duke of Devonshire; born Nov. 30, 1836; was graduated at Trinity College, Cambridge, in 1858. He was private secretary to Lord Granville and to Mr. Gladstone, and was financial secretary of the Treasury in 1880–82. He sat in the House of Commons as a Liberal for a Yorkshire district from 1865 until the spring of 1882, when he succeeded W. E. Forster as Chief Secretary for Ireland. On May 6th he reached Dublin, and on that evening he and Mr. Burke, the Under-Secretary, were stabbed to death in Phœnix Park by "Invincibles." Eight months later 20 men were tried for the murders, of whom five were hanged, three sentenced for life, and nine to various terms of imprisonment. James Carey and two others turned queen's evidence, and were discharged. Carey emigrated to South Africa, but was shot on board ship by O'Donnell, who is said to have been detailed for that purpose by one of the Irish secret societies. O'Donnell was taken back to England and hanged a few months later.

CAVENDISH, WILLIAM, a duke of Newcastle. See NEWCASTLE, DUKES OF, Vol. XVII, p. 380.

CAVIARE, the roe of sturgeons prepared for food, now largely produced for the market in the United States. See STURGEON, Vol. XXII, p. 612.

CAVITÉ, in Luzon Island, Philippines, was the scene of the naval battle of May 1, 1898, wherein an American squadron, under Commodore George Dewey, destroyed a Spanish squadron, under Admiral Montojo. Population of town and port about 6,200. See Vol. V, p. 273; also MANILA, these Supplements.

CAWDOR, a village in Nairnshire, northeastern Scotland, 5½ miles S. W. of Nairn. Cawdor Castle, near by, is the seat of the Earl of Cawdor. It was founded in 1454, but is one of the three places which tradition has assigned as the scene of King Duncan's murder by Macbeth in 1040.

CAXIAS, a city in the state of Maranhão, Brazil, at the head of navigation on the Parnahiba river, about 175 miles from its mouth, in the center of a large agricultural and grazing district. It is the site of, and has grown from, an old Jesuit mission. Population, about 10,000.

CAYAMBI OR CAYAMBURO, the highest mountain on the equatorial line in the world, and the only one on that line with a perpetual snow-cap. It is an extinct volcano of Ecuador, 15,534 feet high. It is one of the eastern Cordilleras of the Andes, about 45 miles N. E. from Quito, rises with conical symmetry from a very extensive base, and is a conspicuous landmark.

CAYLEY, ARTHUR, English mathematician;

born at Richmond, Surrey, Aug. 16, 1821; died Jan. 26, 1895. He was educated at King's College, London, and Trinity College, Cambridge, and was graduated as senior wrangler, and first Smith's prizeman in 1842. Called to the bar at Lincoln's Inn in 1849, he was for a time established in business as a conveyancer. In 1863 he was elected first Sadlerian professor of pure mathematics at Cambridge, and in 1875 was elected to a fellowship of Trinity College; was president of the Royal Astronomical Society (1872–73), and of the British Association at its Southport meeting in 1883, where his address on the ultimate possibilities of mathematics attracted much attention. In 1882 he gave a course of mathematical lectures at the Johns Hopkins University, Baltimore, and in the same year received the Copley medal of the Royal Society. He received honorary degrees from Oxford, Dublin and Leyden. His chief book is an *Elementary Treatise on Elliptic Functions* (1876); but his papers were numerous, and are collected into 10 volumes in process of publication by the Pitt Press. He contributed mathematical articles to this ENCYCLOPÆDIA, among the most important of which are FUNCTIONS; GEOMETRY, ANALYTICAL; NUMBERS; and SERIES. He was a founder of the *Quarterly Journal of Pure and Applied Mathematics*, propounded a "theory of invariants," and was distinguished not only for general scientific information, but for his originality and scope of mathematical analysis, that opened new fields of thought. In 1890 he was made an officer of the French Legion of Honor.

CAYMAN. See CROCODILE, Vol. VI, p. 594.

CAYMAN ISLANDS, three islands in the Caribbean Sea, off the south coast of Cuba, nearly in lat. 19° N. They are British possessions, attached to Jamaica, and are governed by a body called "Justices and Vestry." Grand Cayman, on the west, is the largest, and is 17 miles long by 4 to 7 broad, and has a population of about 4,500. Little Cayman is in the center, and Cayman Bræ on the east. Exports are cocoanuts and turtles.

CAYUGA, a village of Cayuga County, central New York, situated on the eastern shore of Cayuga Lake, two miles from its outlet, which is here crossed by a railroad bridge of the New York Central and Hudson River railroad, about a mile long. Population 1890, 511.

CAYUGA, capital of Haldimand County, southern Ontario, on the Grand River, 20 miles above where it flows into Lake Erie, and on the Grand Trunk railroad. It has a large trade in grain and plaster. The river is navigable. Population, 822.

CAYUGA INDIANS, a tribe of North American Indians who originally lived at the foot of Cayuga Lake, New York, and from which they take their name. In the sixteenth century they became a member of the Iroquois, or Five Nations, which afterward, in 1712, became the Six Nations. The stronghold of the powerful Iroquois was in the basin of lakes Erie, Ontario and Champlain. The Cayugas, like the other members of the confederation, preserved their tribal distinctions. They suffered the same decline with the others at the close of the American Revolution. At present the tribe numbers 1,300, and is located, for the most part, near the Grand River, in Ontario, Canada. A few of them are in the Indian Territory and Wisconsin. See *Six Nations*, under INDIANS, Vol. XII, p. 832.

CAYUGA LAKE, a beautiful small sheet of water which separates Cayuga and Seneca counties, central New York. It is 38 miles long, from 1 to 3 miles wide, its greatest depth being 500 feet. Its surface is 387 feet above the sea. Its waters are discharged into Lake Ontario, through the Seneca River. It has a varied supply of fish; it is traversed by regular lines of steamboats, plying daily during the season between Ithaca and Cayuga Bridge.

CAZALÈS, EDMOND DE, a French ecclesiast and politician; born at Grenade-sur-Garonne, Aug. 31, 1804; died at Rennes, Jan. 28, 1876. He entered into the practice of law, but very soon abandoned it on account of his religious enthusiasm, which led him to take holy orders in the Roman Catholic Church in 1843. He was appointed director at the Montauban Ecclesiastical Seminary. He took a prominent part in political affairs and wrote several works on the evils of the time, his *Nos Maux et Leurs Remèdes* (1874) being notable for the discussion it awakened.

CAZENOVIA, an educational village of Madison County, central New York, situated on a small lake 18 miles S.W. of Syracuse. It has some manufactories, and is the seat of Central New York Conference Seminary. Population 1890, 1,987.

CAZIN, JEAN CHARLES, French artist, born at Samer, about 1840; studied under Lecocq de Boisbaudran; went to England, and while there executed his first Salon painting, *Le Chantier*. He is best known as a landscape-painter, but has equal art in the decorative. His *Flight into Egypt; Ishmael; Judith;* and *The Travellers*, are the best known of his works.

CEANOTHUS, a North American genus of shrubs of the family *Rhamnaceæ*, most largely displayed in California. A common eastern form is the *C. Americanus*, known as "New Jersey tea" or "red-root." Some of the species of the Rocky Mountains and California are tall shrubs or low trees with a profuse display of showy flowers.

CEBALLOS, José, Mexican soldier; born in the city of Durango, March 15, 1830. He commanded a regiment in the national army of Mexico during the administration of President Juarez, and was appointed brigadier-general; waged war on the bandit Losada; deposed, according to military orders, Camarena, governor of Jalisco, and then ruled over that state. When General Diaz became Mexican President, Ceballos plotted against him, but afterward became one of his strong adherents, and returned to Mexico, where he was restored to rank, given the highest office after that of President—the governorship of the federal district—and chosen as Senator. He manifested great enmity toward the newspapers, and

several journalists suffered imprisonment through his orders.

CEBIDÆ, a family of apes. See APE, Vol. II, pp. 152–155.

CECIDOMYIA, a gall-making cereal pest. See WHEAT, Vol. XXIV, p. 535.

CECIL, RICHARD, clergyman; born in London, Nov. 8, 1748; died at Tunbridge Wells, Aug. 15, 1810. He was ordained a minister of the Church of England in 1776; minister at St. John's, London, and Risley in Surrey. He wrote a series of biographies, which include some of Rev. John Newton; a series of miscellaneous tracts; a volume of sermons; and a volume of *Remains*, a work eminently useful to ministers.

CECROPIA, a South American and West Indian genus of *Urticaceæ*, known as "trumpet-trees." The pith is divided into chambers, and these partitions being removed, the branches are made into water-pipes and wind-instruments. The wood is very light, and is used to make floats for nets, and by the Indians in kindling fires, by friction against a harder piece of wood. The bast yields a cordage fiber, and the outer bark is astringent. The fruit resembles a raspberry, the buds furnish a potherb and the juice hardens into caoutchouc. The pith-chambers are inhabited by ants, which feed upon small food-bodies formed on the leaf-petioles, and serve as a police-protection against dangerous ants and other insects. The leaves are a favorite food of the sloth.

CECROPIA, a moth of the genus *Platysamia*, widely distributed in the United States. The wings are brown, with a red and black crescent-like spot near the center. The young caterpillars are black, but the mature specimens are of a green color. They construct cocoons of very fine silk. In California an attempt is being made to cultivate the cecropia silk-worm.

CEDAR, BASTARD BARBADOS (*Cedrela odorata*), a tree of the family *Meliaceæ*, a native of the tropical parts of America. It is often upward of 80 feet high, with a trunk remarkable for its thickness. The wood has an agreeable fragrance, and, being light and soft, it is used for canoes, shingles and cigar-boxes. In France it is used in making black lead-pencils. True Barbados cedar is *Juniper barbadensis*, and is of much less importance. The true cedar belongs to the coniferous genus *Cedrus* (q.v.).

CEDAR–BERG, a mountain range in Cape Colony, stretching north and south on the east side of Olifant River valley, in Clanwilliam division. The name is from the plantations of Cape Cedar (*Widdringtonia juniperoides*), which are now, however, being fast destroyed. This is the only locality where this species is found.

CEDAR–BIRD. See WAX-WING, Vol. XXIV, p. 461.

CEDAR CREEK, a stream of northern Virginia, which rises in the North Mountains and flows between Shenandoah and Frederic counties, emptying into the Shenandoah River. A battle was fought here on Oct. 19, 1862, which takes its name from the creek. Sheridan's army was encamped on its left bank, a little less than a mile above the north fork. He himself had been called to Washington, and had left General Wright in command. During the previous night the Confederates had marched around and taken their position behind and to the left of the Union line. Part of the Union troops were routed, the rest General Wright withdrew about a mile to the north, taking up a more favorable position. The Confederates followed, though in disorder, and formed again in front of General Wright's line. At this time, a little before one p.m., Sheridan, who had heard of the battle, at Winchester, arrived, and his appearance inspired his men with confidence, so that they drove back the enemy. General Sheridan then prepared for aggressive action, and about four p.m. made a spirited attack, driving the Confederates completely from the field, and recapturing all the guns and ammunition which had been lost on the previous night, and capturing, in addition, 24 guns and 56 ambulances from the enemy. The Union losses in killed, wounded and prisoners was estimated at 6,000. The Confederates lost about 3,100. This was the last important battle in the Shenandoah valley. It was this ride of Sheridan's, from Winchester to Cedar Creek, that forms the theme of Thomas Buchanan Read's famous poem.

CEDAR FALLS, a city of Blackhawk County, northeastern Iowa, situated on the Cedar River, 100 miles W. of Dubuque, on the Burlington, Cedar Rapids and Northern, Chicago Great Western and Illinois Central railroads. It is the seat of a state normal school, and contains oatmeal and paper mills, and various other manufacturing industries, most of them utilizing the water-power obtained from the fall of the Cedar River as it passes through the town. Population 1890, 3,459.

CEDAR KEYS, a seaport and city on one of the Cedar Keys, Levy County, western central Florida; terminus of the Florida Central and Peninsular railroad; 35 miles S.W. of Gainesville, It is on the Gulf of Mexico, and its harbor is formed by several small islands, on one of which stands a lighthouse. The town has an ice factory, a large trade in lumber, oysters and pencil-wood, and has a very healthful climate. Population 1890, 1,600.

CEDAR MOUNTAIN, a battlefield situated near the Rappahannock River, in Culpeper County, northwestern Virginia. The action took place Aug. 9, 1862, between the Confederates under General Jackson and the Federal forces under General Banks. The Union army was greatly outnumbered and defeated, with a loss of 1,400 in killed and wounded, 400 taken prisoners, besides the loss of a large quantity of ammunition and stores. The Confederate loss was 1,314.

CEDAR RAPIDS, a city of Linn County, central eastern Iowa, on the Cedar River, 79 miles S.W. of Dubuque, at the junction of the Chicago and Northwestern and the Burlington, Cedar Rapids and Northern railroads also on the Illinois Central and on the Chicago, Milwaukee and St. Paul railroads. It is also the terminus of the

Dubuque and Southwestern railroad. The Coe Collegiate Institute (Presbyterian) is situated here. The rapid current of the river at this point provides ample water-power for flour-mills and various manufactories of machinery, carriages and agricultural implements. It has a pork-packing establishment, and the extensive car-shops of the Burlington, Cedar Rapids and Northern railroad. Population 1890, 18,020; 1895, 21,555.

CEDAR RIVER rises in southeastern Minnesota, enters Iowa at Mitchell County, runs southeast past Waverley, Waterloo and Vinton, and enters the Iowa River some 25 miles above its junction with the Mississippi. Its length has been estimated to be between 375 and 400 miles. It flows through a very fertile prairie region.

CEDAR SPRINGS, a village of Kent County, in the central western part of the southern peninsula of Michigan, on the Toledo, Saginaw and Muskegon and the Grand Rapids and Indiana railroads, 18 miles N. of Grand Rapids. It has a number of lumber-mills. Population 1890, 1,038.

CEDAR SPRING, a village of Spartanburg County, northwestern South Carolina, about 90 miles N.W. of Columbia, and 4 miles W. of Spartanburg. It is the seat of the state institution for the deaf, dumb and blind.

CEDARTOWN, capital of Polk County, northwestern Georgia, on the Chattanooga, Rome and Columbus and the East and West railroads, 20 miles S. of Rome. Its principal industries are iron-working, lumber-making and fruit-raising. Population 1890, 1,625.

CEILING. See BUILDING, Vol. IV, pp. 505, 506; also, for churches, see ARCHITECTURE, Vol. II, p. 462.

CELAKOVSKY, FRANZ LADISLAUS, Bohemian poet and professor of Slav philosophy; born in Strakonitz, March 7, 1799; died at Prague, Aug. 5, 1852. His principal works are *Echoes of Russian and Bohemian Folk-Songs* (1833–40), and a cycle of love-songs and didactic and political poems (1840). He also translated the works of Herder, Goethe and Scott.

CELANDINE, a popular name applied to two dissimilar plants: (1) *Chelidonium majus*, a member of the poppy family, common to Europe and the United States. It is a tall perennial branching herb, with pinnate leaves, and small yellow flowers in umbels. The whole plant is full of an acrid yellow juice, which has some reputation in medicine. Its nearest ally (*Stylophorum diphyllum*) is known as "celandine poppy." (2) *Ranunculus Ficaria*, one of the early "buttercups" of Europe, otherwise known as "pile-wort."

CELAYA, a town in the state of Guanajuato, central Mexico, situated on the Rio Laja, about 150 miles, by the Mexican National railroad, N.W. of the City of Mexico, and about 30 miles W. of Queretaro by the Mexican Central. It has several fine plazas, handsome churches, and manufactories of cotton and woolen cloths and saddlery. Population, 21,000.

CELESTIAL PHOTOGRAPHY. See ASTRONOMICAL PHOTOGRAPHY, in these Supplements.

CELESTINE. See MINERALOGY, Vol. XVI, p. 400.

CELINA, a village and the capital of Mercer County, central western Ohio, situated at the junction of the Cincinnati, Jackson and Mackinaw, the Cincinnati, Hamilton and Dayton and the Lake Erie and Western railroads, on the northwest bank of the Great Reservoir. It has several churches, banks and two planing-mills. Population 1890, 2,702.

CELLE, a Prussian town. See ZELLE, Vol. XXIV, p. 775.

CELLIER, ALFRED, English musician and composer; born at Hackney, England, Dec. 1, 1844; died in London, Dec. 28, 1891. He was of French parentage; conductor of the Belfast Harmonic Society in 1865; orchestral conductor of the Opera Comique in 1877–79, and with Sir Arthur Sullivan at Covent Garden. He composed *Charity Begins at Home; Sultan of Mocha; Pandora; The Tower of London; The Mountebanks; Dorothy;* and numerous other operas.

CELL-LIFE, ANIMAL. See EMBRYOLOGY, in these Supplements.

CELL-LINEAGE. See EMBRYOLOGY, in these Supplements.

CELLS. See BIOLOGY, Vol. III, pp. 681–683; MORPHOLOGY, Vol. XVI, pp. 840, 841.

CELLS, DEVELOPMENT OF PLANT. See MORPHOLOGY, in these Supplements.

CELLS, PRIMARY AND SECONDARY. See ELECTRICITY, §97–109, in these Supplements.

CELLULAR CARTILAGE. See ANATOMY, Vol. I, p. 852.

CELLULOID OR PARKESINE, a substance consisting chiefly of a dried solution of guncotton (pyroxylin). A variety of it can be made with pyroxylin and camphor. It resembles ivory, horn, tortoise-shell and hardened India-rubber. The pyroxylin is prepared by treating cellulose from such vegetable materials as cotton, rags, paper-maker's half-stuff, or paper itself, with a mixture of one part of strong nitric acid and four parts of strong sulphuric acid. The distillate obtained by distilling wood-naphtha with chlorid of lime is used as a solvent for the pyroxylin. When the excess of solvent is removed from the pyroxylin, it is mixed with a considerable quantity of castor-oil or cottonseed-oil, and made into a paste between heated rollers. For a hard compound, the quantity of oil should be less than the pyroxylin. In a plastic condition, celluloid can be spread on textile fabrics, or it may be made as hard as ivory, for which it is largely used as a substitute. Billiard-balls, piano-keys and combs are made of it. It can be colored to represent amber, tortoise-shell or malachite. In imitation of red coral it has been a great deal used for jewelry.

CELLULOSE, primarily, the essential constituent of the framework or wall-membrane of all plant-cells. It is a secretion from the contained protoplasm, but in the advancing growth of the plant the walls become incrusted with resin, coloring matter, etc. It composes the cells of wood as wax composes the cells of a honeycomb. It is

changed to glucose by long boiling with dilute sulphuric acid. A substance resembling parchment is readily obtained by treating unsized paper with cold sulphuric acid. Cellulose is also said to exist in the tunics of *Ascidia*, and in other invertebrates. It is insoluble in water, alcohol, ether, dilute alkalies and dilute acids. It is remarkable for its insolubility, being dissolvable, so far as at present known, only by an ammoniacal solution of oxid of copper, from which it may be again precipitated. It may be bleached by the action of chlorin water. Skeleton leaves, so often made in phantom bouquets, consist of nearly pure cellulose. They are usually prepared either (*a*) by boiling the leaves in a dilute solution of caustic soda, and bleaching by an immersion in a solution of hypochlorite of lime, or (*b*) by suspending the leaves in a mixture of nitric acid and chlorate of potassa for several days. It is isomerous, with starch in its composition, and allied to starch, sugar and inulin. Cotton and bleached flax, as well as hemp, are nearly pure cellulose. With age it becomes largely transformed into lignin, suberin, or mucilage. In some filter-paper, notably the Swedish, it is in almost a chemically pure state. Sugar and gum are nearly allied to it in composition. When pure, it is fibrous or spongy, white, translucent and often silky. Under the microscope the fibrous varieties appear like spun glass. It is tough and extremely elastic, with a specific gravity of 1.5.

By dipping paper or cotton or linen fabrics in a copper-ammonia solution of cellulose, and then passing the sheets between rolls, they are rendered water-proof. Several layers of such sheets of cloth or fiber pressed together form an artificial wood of enormous strength. A plastic mass of this material can be readily prepared, suitable for the manufacture of water-pipes, gas-pipes, hats, clothing, boats, etc.

Cellulose, by reason of its peculiar properties, is being largely introduced into ship-building, as it is specially adapted for resisting blows, concussions, or perforations, either above or below the water-line. Its component parts are carbon, dydrogen and oxygen, and its scientific formula is given as $C^{18}H^{30}O^{15}$.

The material used for ship-protection is usually made from the ground fiber of the cocoanut with a small percentage of original fibers. It is extremely light, and has the property of rapidly swelling when wet. A cubic foot weighs about seven and a half to eight pounds. It is practically free from danger of fire, burning very slowly, and with great difficulty when compressed. In France, experiments have been made by firing a ten-inch shot through a mattress of cellulose; the fibers came together and swelled so rapidly that only three and a half gallons per minute of water passed through the aperture, and in a short time the aperture was closed entirely. Cellulose was first used in ship-building in 1884, but so rapidly did it obtain favor that in 1890 the French had introduced it into the construction of some 40 vessels of their navy, and in the same year its use was ordered as a means of protection in the construction of ships in Russia, Holland, Japan and Greece, as well as in the American navy. Its cost is about $1 a cubic foot, or approaching $250 a ton. (See FIBRES, Vol. IX, pp. 131, 132, BIOLOGY, Vol. III, p. 169; and GUN-COTTON, Vol. XI, p. 277.

CELLULOSE SILK. See SILK, ARTIFICIAL, in these Supplements.

CELMAN, MIGUEL JUAREZ, Argentine Republic statesman; born in Cordoba, Argentine Republic, September, 1844; governor of the province of Cordoba in 1880; a member of the National Congress in 1884. He was elected President of the republic in 1886, and retained the office until 1890, when he was compelled to resign, owing to the national financial panic and bankruptcy, the blame for which was laid on Celman and his Cabinet.

CELSUS, AURELIUS CORNELIUS, physician. See ANATOMY, Vol. I, p. 802.

CELT, the name by which certain weapons or implements of early inhabitants of western Europe are known among archæologists. The term is generally applied to a stone instrument of wedge-like form found in barrows and other repositories of Celtic antiquities. See ARMS AND ARMOR, Vol. II, p. 553.

CELTIC CHURCH. See CELTIC LITERATURE, Vol. V, pp. 303–306; CULDEES, Vol. VI, pp. 693, 694.

CELTS OR KELTS. See CELTIC LITERATURE, Vol. V, pp. 297–305.

CEMBRA PINE. See PINE, Vol. XIX, pp. 105, 106.

CEMENTATION, a process in metallurgy. See IRON, Vol. XIII, pp. 339–343.

CEMENTITE. See IRON AND STEEL, in these Supplements.

CEMETERIES, NATIONAL. There are eighty-three cemeteries kept in condition and cared for by the United States government. In such cemeteries are buried soldiers and officers who have died in battle during a war, or who have died while in active service. Special provisions are made at times to provide for the burying there of ex-soldiers who die paupers. These eighty three national cemeteries are scattered throughout the states of the Union, but are principally near the larger battle-fields of the Civil War, and near United States army posts. They are in charge of the quartermaster's department.

CENIS, MONT, a carriage pass 6,672 feet in height, and a peak of the Alps of 11,451 feet, on the eastern border of the French department of Savoy. Napoleon I had a road constructed over the pass from the Isère valley, in France, to Susa, in Italy, in 1803–10, for strategical purposes. The Mont Cenis tunnel, on the Franco-Italian railway, was constructed in 1857–71, under the neighboring Col de Fréjus, and reaches an altitude of 4,395 feet. See TUNNELLING, Vol. XXIII, p. 624.

CENOZOIC, CAINOZOIC OR CÆNOZOIC PERIOD. See GEOLOGY, Vol. X, pp. 360–365.

CENSER, a vase or other sacred vessel used for burning perfumes. Censers were much used in the Hebrew service of the Temple, and by the Greeks. The censer, called also a *thurible*, is used in the Roman Catholic Church at mass, vespers and other offices. It is suspended by chains which are held in the hand, and is swung in the air, so as to throw the smoke of the incense in all directions.

CENSORSHIP OF THE PRESS. See BIBLIOGRAPHY, Vol. III, pp. 658, 659; PRESS LAWS, Vol. XIX, pp. 710–714.

CENT, a coin representing the one hundredth part of a dollar, and of legal tender to the extent of twenty-five in one payment. The Dutch cent is a copper coin, the hundredth part of a guilder. In the United States it is a coin of copper, or copper alloy, and is nearly equal to an English halfpenny.

CENTAUREA, a genus of plants of the family *Compositæ*, containing numerous species of annual and perennial herbaceous plants, chiefly natives of temperate and cold regions. The corn bluebottle (*C. cyanus*), common in flower-gardens, has flowers variously modified by cultivation. The generic name has its origin in an ancient legend concerning the cure of a centaur by one of these species. The genus is related to the thistles, its numerous species (often called "star thistles,") belonging chiefly to the eastern hemisphere, many of them being cultivated.

CENTAURUS, the Centaur, a constellation in the southern hemisphere, represented by a form half man and half horse. The stars in this constellation are 37 in number. See ASTRONOMY, Vol. II, p. 817.

CENTAURY, the common name of the species of *Centaurea*, (q.v., in these Supplements); also applied to various species of the family *Gentianaceæ*, with pink or rose-colored flowers, notably the European species of *Chlora* and *Erythræa*. In America the name is applied to the numerous species of the gentianaceous genus *Sabbatia*.

CENTENNIAL EXHIBITION. See EXHIBITION, Vol. VIII, p. 804; and WORLD'S FAIRS, in these Supplements.

CENTER COLLEGE, an educational institution for men at Danville, Kentucky; organized in 1819; is under the auspices of the Presbyterian Church. The president is Rev. W. Clark Young. In 1895 there were 16 in the faculty, 269 students and a library of 11,000 volumes.

CENTER OF GRAVITY. See GRAVITATION, Vol. XI, pp. 69, 70.

CENTER OF OSCILLATION. See CLOCKS, Vol. VI, pp. 14, 15.

CENTER OF PERCUSSION. See MECHANICS, Vol. XV, p. 770.

CENTERING, the framework upon which an arch or vault of stone, brick or iron is supported during its construction. The simplest form of centering is that used by masons and bricklayers for the arches of common windows and doors. This is merely a deal board of the required shape, upon whose curved edge the bricks or stones of the arch are supported until they are keyed in In building bridges or other structures, where arches of great span are to be constructed, the centering is usually made of framed timbers, or timbers and iron combined.

CENTERVILLE, capital of Appanoose County, central southern Iowa, on the Chicago, Rock Island and Pacific and on the Keokuk and Western railroads, 75 miles S.E. of Des Moines. The surrounding country is rich in coal, stone and timber and in agricultural products. Population 1890, 3,668.

CENTERVILLE, a town and the capital of Queen Anne County, central western Maryland, on the Corsica Creek, where it enters an arm of the Chester River inlet; on the Philadelphia, Wilmington and Baltimore railroad; 36 miles by water S.E. of Baltimore. It has a considerable oyster trade; marl is found in the neighborhood. Population 1890, 1,309.

CENTIGRADE THERMOMETER. See THERMOMETER, Vol. XXIII, p. 289.

CENTNER, in metallurgy, a weight of 100 pounds; the pound is divided into 32 parts or half-ounces, the half-ounce into two quarters, and each of these into two drams. In many European countries centner is a common name for a hundredweight, but the centner of Germany, Austria, Sweden, Denmark and Switzerland is now fixed at 50 kilos, or 110.23 pounds avoirdupois. The cental (100 pounds) of the United States and Great Britain is often called centner.

CENTRAL AMERICAN ANTIQUITIES. See AMERICA, Vol. I, pp. 693, 694.

CENTRAL CITY, capital of Gilpin County, northern central Colorado, situated on the Denver and Gulf branch of the Union Pacific railroad, 40 miles W. of Denver, among the Rocky Mountains. It has a fine school, and its prosperity is due to the gold-mines in the vicinity. Population 1890, 2,480.

CENTRAL CITY, capital of Merrick County, southeastern central Nebraska, on the Platte River, and on the Burlington and Missouri and the Union Pacific railroads; by the latter, 132 miles W. of Omaha. The surrounding country is fertile, producing principally grains and hay. Population 1890, 1,368.

CENTRAL FALLS, a village of Lincoln town, Providence County, Rhode Island, on the Blackstone River, and the New York, New Haven and Hartford railroad, six miles above Providence. It is an active manufacturing town, producing cotton and woolen goods, machinery, leather, thread, hair-cloth, and has foundries and copper-refineries. Population 1895, 15,828.

CENTRAL FORCES. When a body is once in motion, unless it be acted upon by some force, it will move uniformly forward in a straight line with unchanged velocity. If, therefore, a body moves uniformly in any other path than a straight line—in a circle, for instance—this must be because some force is constantly at work which continuously deviates it from this straight line. If the deviating force acts toward a point, as, for

example, the force of gravity in the case of planets, the force is called a *central force.*

CENTRALIA, a city and railroad junction of Marion County, central southern Illinois, on the Centralia and Chester, the Illinois Central, the Jacksonville, Louisville and St. Louis, and the Louisville, Evansville and St. Louis railroads. The Illinois Central Railroad Company has its machine-shops here; there are also various manufactories, and it is the center of the Illinois fruit belt. The fair grounds of southern Illinois are located here. Population 1890, 4,763.

CENTRALIA, a city of Lewis County, southwestern Washington, on the Chehalis River, and on the Northern Pacific railroad, 51 miles S. of Tacoma. Its industries are coal-mining, lumbering and agriculture. Population 1890, 2,026.

CENTRALIA, a city of Wood County, central Wisconsin, on the Wisconsin River, directly opposite Grand Rapids, and on the Chicago, Milwaukee and St. Paul, the Green Bay, Winona and St. Paul and the Port Edwards, Centralia and Northern railroads. It has several manufactories, principally of wooden articles. Population 1895, 2,039.

CENTRALIA, a town in Boone County, central Missouri, on the Chicago and Alton and the Wabash railroads, 20 miles N.N.E. of Columbia. The surrounding country is a farming and grazing district. Population 1890, 1,275.

CENTRAL PARK. See NEW YORK, Vol. XVII, p. 466.

CENTRARCHIDÆ, a family of bold carnivorous fishes found in the fresh waters of North America. The sunfish, rock-bass and black-bass are examples.

CENTRIFUGAL AND CENTRIPETAL are terms sometimes used in botany to designate two different kinds of inflorescence, the former term being applied when the development of flowers proceeds from the apex toward the base of the axis, and the latter when it is from the base upward toward the apex. Originally applied to flat-top inflorescences in which the order of blooming was really from the center toward the circumference, or *vice versa.*

CENTRIFUGAL AND CENTRIPETAL FORCES. See MECHANICS, Vol. XV, p. 682.

CENTROSOME. See CENTROSPHERE, in these Supplements.

CENTROSPHERE, in botany, a name applied to a cell-body closely associated with the nucleus. Centrospheres usually occur as a pair of spherical bodies in contact with the nucleus, each of which consists of a small dense central body (*centrosome*), surrounded by a clear layer, and limited by granular substance. The centrospheres are observed to play an important part in nuclear and cell-division, in consequence of which they are often called "directive spheres"; also called "asters" from the fact that they are centers of radiating lines of structure. Their exact nature and function are still obscure. In fact, it is a question whether the centrosome is not the only essential part, and the rest of the somewhat indefinite so-called centrosphere simply a portion, of the cytoplasm. See figure under KARYOKINESIS, in these Supplements.

CENTURIES OF MAGDEBURG, Protestant ecclesiastical annals. See CHURCH HISTORY, Vol. V, p. 765.

CENTURY, in modern usage, a period of 100 years. It is also used figuratively of any long period of time. The term was used originally in reference to a division of the Roman tribes for the election of magistrates, passage of laws, etc., in which the voting was done by centuries (companies of 100 men each). It was soon applied to a company of cavalry; a division of the Roman army. See ROME, Vol. XX, pp. 734, 735.

CENTURY-PLANT, the popular name of *Agave Americana*, a Mexican plant of the family *Amaryllidaceæ*, otherwise known as American aloe. It develops a large cluster of very thick and large spiny leaves, from the midst of which, after a varying number of years, dependent on the climate, a flowering stalk very rapidly rises, attaining a height of 20 to 30 feet, and bearing an enormous cluster of greenish-yellow flowers. After flowering, the plant dies. The popular name arose from the erroneous impression that a century of leaf-formation and food-storage elapsed before the appearance of the flower-stalk.

CEPHALOPODA. See MOLLUSCA, Vol. XVI, pp. 664–684.

CEPHREN, CHEFREN OR KHAFRA, an Egyptian king. See CHEPHREN, Vol. V, pp. 582, 583.

*CERAMIC ART.—*Its Development in the United States since 1880.* Ceramic art, or the department of the plastic and decorative arts which deals with objects made of clay, has been developed to its present degree of excellence in the United States practically within the last twenty years. The chief causes contributing to bring about this rapid advance were the Centennial Exhibition of 1876 and the tariff act of 1883. The former event, with its extensive exhibit of European pottery, opened the eyes of the American manufacturer to his own inferiority, and fired him with the spirit of emulation; the latter, by rendering practicable, commercially, the production of finer wares, gave opportunity for the acquirement of that practice and experience which has since ripened into an established and perfected ceramic art in America. Imitation was the first and most natural characteristic of the attempt to introduce grace and beauty into the homely practice of utilitarian potting. The first effects of this movement were seen in the occasional production of ornamental single pieces, patterned closely upon the famous faience of Limoges, or the oddly shaped, gorgeously decorated wares of Japan, and in a gradual, though marked, refinement in the bodies of the dense and cumbrous stone and earthenwares which had contrasted so clumsily in 1876 with the delicate porcelains and semi-porcelains of Worcester, Doulton and Sèvres. A marked improvement in the handling of glazes and more frequent use of colors, both body and relief, man-

* Copyright, 1897, by The Werner Company.

ifested themselves at this time. Commercially, the demand for artistic wares was still imperfectly met by the liberal use of bands and lines, and the introduction of a few very cheap and common-printed patterns, mainly for toilet-ware. Until 1883 these conditions continued to prevail; porcelain was produced in quantity by two factories only; plain and cheap-printed wares made up the bulk of the crockery produced; and artistic ornamental pieces of any pretensions to excellence of shape or decoration were produced only by a few enthusiastic experimentalists and at prohibitive prices.

The first and most difficult step in the evolution of American ceramics was the substitution of a lighter and more vitreous body for the heavy earthenwares then being fired. From the ordinary yellow, cream-colored and white granite bodies, a great variety of intermediate consistencies has been developed, ranging all the way up through the semi-porcelains and porcelains to the fairy-like fragility of the Belleek or egg-shell china. Ivory-finish and underglaze print decorations, fashioned more or less upon the Japanese school, were the earliest original forms of artistic pretensions, and they were speedily followed by an increased attention to modeling and the production of shapes differing from the stereotyped forms hitherto almost universal. Heavy, colored and transparent glazes were slowly introduced, blended upon harmoniously tinted bodies. Rich mazarine-blues, relieved with paste and gold decoration in stipple and solid, were among the more handsome of the early achievements of the improving art. Majolica, in shapes which showed considerable originality of design and artistic treatment, was also soon produced. Spurred by a growing public demand for art in even the every-day form of pottery, printed and colored decorations supplemented the earlier lines and bandings, and the decorating-shop, employing girls and women, became a part of every pottery. The transference of the design from the copperplate to the wares it was intended to decorate was accomplished by taking upon tissue-paper, with specially prepared ink, an etching from the plate. This, while still wet, was applied to the surface of the biscuit-ware, glaze applied over it in turn, and the whole fired, the transparent glaze protecting the design and rendering it permanent. Where colors were further used, the printed ware after firing went to the decorating-shop, where deft-handed and skillful girls and women filled in with their brushes those portions of the design requiring embellishment, and the ware was again fired in what is technically called the "enamel-kiln." The growth of decoration in American pottery is best shown in the fact that where, only a few years prior to 1880, one man could do, and did, the decorating for every pottery in Trenton, which city produces almost one half of the goods made in this country, there are to-day over four hundred decorating-kilns in the potteries of the United States. The economic changes resultant upon the development of American ceramics, as seen in the increased production and importance of decorated wares, are more properly discussed under the heading of POTTERY INDUSTRY (q.v., in these Supplements), the manifestations of the dirigent and artistic forces active in shaping ceramic progress being more exclusively within the province of this article. The manufacture of Belleek porcelain, so called after the little Irish town where its manufacture has long been famous, was begun in this country, in Trenton, about 1882. It is the most fragile ware known, and is, hence, often spoken of as egg-shell china, and is noted for its lightness and translucency of body, as well as the pearly lustrousness of its glaze. Originally produced almost exclusively in fancy shell-like designs, American manufacturers have developed it to a distinctive degree in graceful and simple forms having the most artistic decoration. The extreme thinness of this ware prevents its handling by the potter in the plastic clay, and it is made by the casting process, slip or clay mixed with water, of the consistency of cream, being poured into plaster molds, where, a portion of the water being absorbed by the porous mold, a thin coating of the clay or body adheres to the sides, and after being sufficiently dried, can be removed and fired. Besides vases and other ornamental forms, this ware is now made in the most exquisite of cream-jugs, pitchers, cups and saucers, ice-cream holders, etc. In its decoration a new feature has been developed by the carving in relief of exquisite tracings and designs upon the unbaked body. The extreme thinness of this body, which renders the work much like carving brittle egg-shell, imparts, owing to its translucency, a soft moonlight effect to the whole, of indescribable beauty. In the Belleek porcelains, or egg-shell chinas, American manufacturers are to-day producing wares which are fully equal to and sell at as high prices as the best of the imported goods.

Of the other wares distinctively the outcome of the ceramic development of twenty years, and the product of the potteries, exhaustive discussion would require far too great a space. Descending the scale of fineness from Belleek, the porcelains and semi-porcelains run through all the varieties of vitrified, thin, Indian, bone, translucent, and hard chinas used in every kind of useful and ornamental ware, including table-service pitchers, jugs, vases, punch-bowls, candelabra, clock-cases, lamp-bodies, plaques, ornamental figures and fancy designs. In their modeling and decoration has been developed the highest form of the potter's art. The rich iridescence of the nacreous Belleek glaze over the soft-toned body-tints; the true overglaze colors and white enameled porcelain table-service wares; the silver and gold raised paste and relief work in exquisitely modeled traceries, sprays and figures; the deep, rich body-colorings, of every degree of mellowness and brilliancy; the soft ivory and vellum finishes; the mellow and marble-textured Parian,—all executed with most admirable art and chasteness of color, modeled with a purity of form and graceful sim-

plicity of shape scarcely excelled by the most celebrated European designers, are the evidence visible to-day of the progress the American potter and ceramic artist has made. And in no branch of artistic endeavor has success been attained by such untiring patience, long and discouraging experiment and research, and the expenditure of such large sums without return, as in this branch of the fictile art. Every piece from the potter's hand, bearing the work of the decorator and glazer, must ultimately be proved, not once and twice, but often thrice, in the fierce heat of the great kilns. Materials must be mixed so that a degree of heat or a second of time shall determine their future consistency, and glazes with known co-efficients of expansion must be adjusted to the varying bodies, while even the mineral colors must be considered by the heat they must withstand.

Besides the porcelains, the greatest artistic success has been attained, perhaps, in the manufacture of faience, several true varieties of which are now made in this country, and to which the application of heavy colored glazes in rich transparent tones of amber, olive, red, black, green, and brown has been most successfully made in jardinières and heavy pieces, while the famous goldstone, tiger's eye and reflecting glazes, together with excellent *pâte-sur-pâte* work, have produced vases and ornamental pieces of rare and exquisite beauty. Decoration in colored slip has especially been carried to a point closely approaching the famous work of Limoges. Red earthenware, hammered and decorated with hand-modeled sprays and figures, or incised and inlaid with white clay in vivid mosaic, has been produced, in addition to the more familiar relief-patterns in this ware. Stoneware with incised decoration and relief-designs is also being made at the present time quite equal in shape and design to the well-known Doulton product. Rococo-relief and gold and colored decorations in porcelain clock-cases and candelabra are also among the promising American productions of later times.

Apart from the production of the pottery proper, a most important branch of the ceramic art, and one in which America to-day leads the world, is the manufacture of art and ornamental tiling. The introduction of the so-called "damp-dust" process, by which the dry, powdered clay, slightly moistened, is subjected to great pressure in dies containing the design, revolutionized the manufacture of tile. Within the four years preceding 1880 this branch of ceramics leapt from obscurity into the front rank of excellence. The process of manufacture after the impression has been taken, as above described, is to fire the tile and afterward glaze or enamel it in delicate colors. The old "wet-clay" process is still used in the so-called plastic sketches, and in some of the encaustic or inlaid floor-tiles. The plastic sketch is almost a picture in clay, and is the highest development of artistic modeling. Panels in relief and intaglio, embossed, enameled and printed tiles, and all the infinite variety of many piece-friezes and facings, are now produced for interior decoration, together with floor-tile, glazed and unglazed, in arabesque, mosaic and damask-finished effects. In the modeling of the many designs, and particularly in the so-called plastic sketch-work, a new and intermediate school of art, combining the painter and the sculptor, has been developed.

The increased use of tiling for interior decoration has been accompanied by a similar growth in the utilization of terra-cotta and ornamental brick for architectural purposes. The development of this branch of ceramics has been greatly aided by the reduced freight rates of later years. The different colored clays found throughout the country can now be obtained in the required quantities at sufficiently low rates by the manufacturer to enable him to produce terra-cotta, the most enduring of all building materials, at a reasonable price. The modeling of the designs for this material has been carried to a point of great artistic excellence, panels, mantels, supports, gargoyles and other architectural details, as well as ornate garden vases and statuary, being supplied in well-conceived forms. Red, buff and white are among the leading colors in architectural terra-cotta, but it is developing steadily in shades harmonious with the brick now being produced.

These last are the latest manifestation of the development of the public taste and of ceramic art, and, in their yellow, buff and soft white tones, are a great improvement in the architectural landscape. Glazed and enameled fire-brick of a variety of shades are also being produced extensively. The enameling process is jealously guarded by the manufacturers as a trade secret, the composition of the peculiar enamel required being known to but a few. See POTTERY, Vol. XIX, p. 600, and in these Supplements.

W. D. WILLES.

CERAMICUS OR CERAMEICUS, an Athenian suburb. See ATHENS, Vol. III, pp. 2, 8.

CERASTES OR HORNED VIPER. See ASP, Vol. II, p. 714.

CERATITES, a genus of cephalopod mollusks, belonging to the family *Ammonitidæ*. The sutures are complex and the lobes serrated. They are found, as fossils, in Mesozoic formations.

CERATODONTIDÆ, a family of lung-fishes (*Dipnoi*), represented by the living genus *Ceratodus*, from the Australian rivers. The family was widely distributed in Europe and America during Jurassic and Triassic times. *Ceratodus*, known to the natives as banamunda, is the most archaic of the interesting lung-fishes. It resembles the gnoid fishes in general external appearance. Gills persist throughout life, and there is only one lung which shows indications of division in the median plane. Other lung-fishes have two lungs. The fish feeds on decaying vegetable matter, such as leaves. It reaches a length of five feet and a weight of twenty pounds.

CERCARIA, a name applied to one of the larval stages of certain trematode worms, as the

liver-fluke (*Distomum*). It was formerly supposed to be a distinct animal. See TREMATODA, Vol. XXIII, p. 536.

CERCIS CANADENIS. See JUDAS TREE, Vol. XIII, p. 761.

CERCOCEBUS, a genus to which the long-tailed African monkey known as "mangebeys" belong. The sooty monkey is a good type of the genus.

CERCOPITHECUS. See APE, Vol. II, pp. 151, 155.

CERDOCYON, a genus of *Canidæ*, apparently intermediate between dogs and foxes, sometimes known as aguara foxes, natives of South America. Their aspect is thoroughly vulpine, as are also their manners. Some of them add to the dispositions of ordinary foxes a singular propensity to steal and secrete brilliant and gaudy objects. Some are natives of the coldest parts of South America, and have a rich fur.

CEREALS, in the United States. See AGRICULTURE, in these Supplements.

CEREBELLUM. See ANATOMY, Vol. I, pp. 871, 872; PHYSIOLOGY, Vol. XIX, p. 38.

CEREBRATION, UNCONSCIOUS. The doctrine of unconscious cerebration, as stated by Carpenter, Laycock and others, holds that as there can be no doubt that molecular changes in the cerebrum accompany all our conscious mental processes, so similar changes may go on in the cerebrum without any consciousness on our part until the complete mental result is presented. It is based on the every-day experience that after one has been vainly trying to recall some name or incident, it will suddenly flash into the mind when one is thinking of some entirely different subject. According to Carpenter, the cerebrum has gone on working automatically, but unconsciously, until the processes accompanying the mental operation of remembering the name or incident have been completed. This doctrine is the same as that of "latent thought" as expounded by Sir W. Hamilton. See HAMILTON, Vol. XI, p. 417; also PSYCHOLOGY, Vol. XX, pp. 47, 48.

CEREBRIN OR CEREBRIC ACID, an organic acid of very complex composition, found in the liver, blood and nerves, but especially in the brain of animals. It is composed chiefly of carbon, oxygen and hydrogen, with small amounts of nitrogen. It is a white solid of a fatty nature, obtainable in crystalline grains, soluble in boiling alcohol or ether, but insoluble in cold ether. The symbol is $C^{80}H^{120}N^{2}O^{16}$.

CEREBRO-SPINAL FLUID. See ANATOMY, Vol. I, p. 865.

CEREOPSIS, a genus of birds to which the New Holland goose belongs. See GOOSE, Vol. X, p. 778.

CERES, a planetoid. See ASTRONOMY, Vol. II, p. 806.

CEREUS, a plant. See CACTUS, Vol. IV, pp. 625, 626.

CERITHIUM, a genus of gasteropod mollusks with numerous and highly variable species. It is said to have led Lamarck to speculate upon the origin of species.

CERIUM. See CHEMISTRY, Vol. V, pp. 542–43.

CERNUSCHI, ENRICO, French economist; born in Milan, Italy, in 1821; moved to Paris in 1850. Incurring the hostility of the commune, he was obliged to leave France in 1871, and was absent for two years. He has traveled a great deal in Asia and America, and has written numerous economical works, including *The Mechanism of Exchange; Illusions of the Co-operative Societies; Silver Vindicated* (1876); and *Bimetallism at Fifteen and a Half*. Died at Mentone, France, May 11, 1896.

CERRO DE POTOSI, a mountain rich in ores. See BOLIVIA, Vol. IV, p. 13.

CERRO GORDO, a mountain pass in the Cofre de Perote, southern Mexico, 60 miles W.N.W. of Vera Cruz, on the road to Mexico. Here, on the 18th of April, 1847, General Scott with 9,000 men, following up his success at Vera Cruz, found Santa Anna with 13,000 men awaiting him, and blocking the pass. After various futile attempts to find or make a route, General Scott decided to assault the pass. This he did with remarkable success, utterly routing the enemy, and capturing 3,000 prisoners, 4,000 or 5,000 stand of arms and 43 pieces of artillery. General Scott lost, in killed, 63; wounded, 368. Next day he advanced to Jalapa and occupied it.

CERROS OR CEDROS, an island off the coast of Lower California, lat. 28° 20′ N., lon. 115° 20′ W., belonging to Mexico. It is rugged and sterile, except at the northern end, where there is some vegetation, and herds of goats are plentiful. The surrounding sea abounds in fish, oysters and lobsters.

CERTHIADÆ, a family of birds. See TREE CREEPER, Vol. XXIII, p. 534.

CERTIFICATE, in the law of England and of the United States, is a written statement by a person having a public or official *status* concerning some matter within his knowledge and authority. In the United States the word is commonly applied to any formal statement made by a public servant in the execution of his duty, as by a collector of taxes, a postmaster, etc.

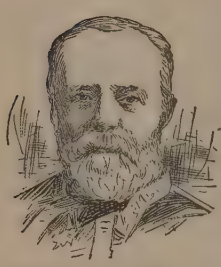
CERTIORARI is a writ issued by a superior court to an inferior court, tribunal or officer exercising judicial powers, requiring such court or tribunal to send up its records in a proceeding pending or already terminated to such superior court. The purpose of a writ of *certiorari* is to bring the records of the inferior court into the superior court for the purpose of determining whether the former had jurisdiction or had proceeded according to the requirements of law. The granting of such writ is within the discretion of the superior court, but, in most states, within certain limits, prescribed by statute. *Certiorari* is never granted when an appeal may be prosecuted from the decision complained of. But if an appeal be improperly denied, or the party be deprived of the right of appeal through fraud or accident, a writ of *certiorari* is frequently granted, and the whole case reviewed, both as to the law and the facts. The writ will lie only for substantial errors, and not for mere irregularities or

informalities at the trial, nor to review matters which are entirely within the discretion of the trial court. *Certiorari* is obtained by petition to the superior court, showing a sufficient ground upon its face for granting the writ. The petition is *ex parte*, and no answer or affidavits can be filed to controvert it, but if its allegations be not maintained at the rehearing, or enough of them to show that the writ was properly issued, it will be dismissed, without considering the merits of the case. If they are sufficient, the case will be considered upon its merits, and the judgment of the inferior court either sustained or set aside.

CERUMEN (Lat., deriv. of *cera*, wax), or ear-wax, a wax-like substance secreted by certain glands in the external auditory canal; acts as a lubricant; possesses a peculiarly bitter taste, which is supposed to prevent insects from entering the auditory canal.

CERUSITE, carbonate of lead; a whitish, compact, very common ore of lead.

CERVERA Y TOPETE, Don Pascual, Conde de Jerez, Marques de Santa Ana, Spanish naval officer, born in Madrid in 1832. On his mother's side he comes from a stock whose name, Topete, has for generations been renowned in Spanish naval annals. His uncle, Admiral Topete, was one of Spain's naval heroes. From early childhood Cervera showed an inclination for a naval career, and he passed his examinations with ease, and gradually rose step by step until he reached the highest post in the Spanish navy. He won promotion under Prim in the war with Morocco in 1859–60, and subsequently did valuable service in the Philippines. In 1862 he was sent to Cochin China, as captain of a warship, and in 1868 to Peru. In 1870 he was sent to Cuba to take charge of the blockade, the "Ten Years' War" being then in progress. At one time he was naval attaché at Washington, where he learned to speak English fluently. Later he was Minister of Marine, and in 1887 he was made admiral. When the war with the United States broke out, Cervera was appointed admiral of a squadron which was ordered to cross the Atlantic. He reported officially that the squadron was in an utterly inefficient condition, and that to take it into Cuban waters would be to court certain destruction. He obeyed orders, however, and arrived in Santiago harbor, Cuba, May 19, 1898, where, seven days later, he was blockaded by a United States squadron. On July 3, Cervera, in obedience to positive orders from Captain-General Blanco at Havana, and in spite of his own belief that he was going to certain destruction, bravely left the harbor and attempted to get past the American blockading fleet. His squadron, however, was overtaken and destroyed; his flagship, the *Maria Teresa*, took fire and was beached; and he himself, though wounded in the arm, jumped overboard and, with his son's assistance, made his way to a life-raft. He was taken on board the *Gloucester*, where he surrendered to Lieutenant-Commander Wainwright. He was kept in honorable captivity as a prisoner of war, at Annapolis, Md., until the signing of the peace protocol on Aug. 12, 1898, when he was released, and on September 13th he sailed for Spain, where he received an enthusiastic welcome from the people.



ADMIRAL CERVERA.

CERVIDÆ. See Deer, Vol. VII, pp. 23–25.

CERVIN, Mont, same as the Matterhorn; q. v., in these Supplements.

CESALPINO. See Cæsalpinus, Vol. IV, p. 633.

CESNOLA, Luigi Palma di, archæologist; born near Turin, Italy, July 29, 1832. He served in the Sardinian army in 1849, in the Crimean War, and on the Union side in the American Civil War, attaining to the rank of colonel; was afterward appointed U. S. consul to Cyprus, where he made extensive collections of antiquities, which in 1873 became the property of the Metropolitan Museum of Art (New York city), of which, on his return from Cyprus, he was appointed director. Wrote *Researches and Discoveries in Cyprus*. See Cyprus, Vol. VI, 749.

CESPEDES Y BORGES, Carlos Manuel de, Cuban patriot; born in Bayamo, Cuba, April 18, 1819; killed in action by the Spaniards, March 22, 1874. He studied and began the practice of law in Spain; was implicated in the Prim conspiracy of 1844, and returned to Cuba; was exiled in 1852 for several years; in 1868 led the general Cuban insurrection, and in 1869 was made president of the republican organization, but was deposed in 1873.

CESSPOOL, a well or tank (preferably of brick or iron) to receive the sewage and drainage of a house. It should be at a safe distance, ventilated to secure the house from its gases, and the contents removed once or twice a year.

CESTODA. See Tape-Worms, Vol. XXIII.

CESTUI QUE TRUST, in law, is a person for whose use another holds the title to real or personal property. See Trust, Vol. XXIII, pp. 596–99.

CESTUS, a girdle worn by Greek and Roman women. The cestus of Venus was decorated with beautiful representations and everything that could awaken love. *Cestus*, or more correctly *cæstus*, is also the name given to a sort of boxing-glove worn by the Greek and Roman pugilists.

CETEOSAURUS or CETIOSAURUS, a genus of large dinosaurian reptiles belonging to the Lower Lias. It reached 50 feet in length.

CETEWAYO or CETSHWAYO, a Zulu king, noted for his resistance to the British in 1879. On Jan. 22 he surprised and massacred the 24th regiment at Isandula, and attacked Rorke's Drift; was defeated by Lord Chelmsford at Ulundi, on July 4th, and was captured and sent to England; was restored to part of his dominions in 1882, but in 1883 his subjects drove him out; gave himself up to the British, who kept him until his death, Feb. 8, 1884. See Zululand, Vol. XXIV, p. 829.

CEYLON. (See Ceylon, Vol. V.) Area, 25,365 sq. miles; pop. (1896), 3,335,909; capital, Colombo, pop. (1891), 126,926. Until recently the chief production for export was coffee, but now more attention is paid to tea, cinchona, cocoanut and other palms. There are 298 miles of railway in operation. The revenue for 1897 was 24,006,521 rupees, the expendi-

ture 21,634,377 rupees. There are 908,309 acres of pasture-land, and under cultivation 2,124,438 acres, of which 728,112 are devoted to rice and other grains; 19,477 to coffee; 404,574 to tea; 878,909 to cocoanut-palms; 39,486 to Palmyra palms; 891 to cinchona; 10,700 to tobacco; and 42,289 to cinnamon. The live-stock of the island in 1895 included 4,227 horses, 1,226,340 cattle, 217,834 goats, and 94,964 sheep. Plumbago is a valuable mining product, and in 1895 there were 299 plumbago-mines. In 1891 the product of the pearl-fisheries was valued at 960,000 rupees. Since then the value has been very small. In 1897 the imports were 98,027,473 rupees, and the exports, 85,099,603 rupees.

CEZIMBRA, a town in Estremadura province, Portugal, on the Bay of Setubal, 18 miles S. of Lisbon. It has active fisheries. Pop. 1878, 3,670.

CHABANEAU, Jean-Eugène-Camille, French philologist; born at Nontron, in Dordogne, March 4, 1831; while in the postal department, became interested in the study of dialects, and attracted such attention by his writings that in 1879 he was appointed professor of the French language in the middle ages at Montpellier. He wrote a *Grammar of the Peasantry; Unpublished Poems of the Troubadours of Périgord; Provincialisms*, etc.

CHABAS, François-Joseph, French Egyptologist; born Jan. 2, 1817, at Briançon; died at Versailles, May 17, 1882. At first engaged in commerce, he became a linguist; but it was not until 1851 that he began the study of hieroglyphics, the first results of which appeared in 1856, followed by a series of invaluable books and papers on two important periods — the conquest of Egypt by the Hyksos, and the time of their expulsion. He wrote *Les Pasteurs en Égypte* (1868); *Histoire de la XIX Dynastie et Spécialement des Temps de l'Exode* (1873); and *Études sur l'Antiquité Historique d'après les Sources Égyptiennes* (2d ed. 1873). In 1873–77 he edited *L'Égyptologie.*

CHABRIER, Emmanuel, French musical composer; born in Ambert, Jan., 1841; was the son of a lawyer, and was a clerk in the Ministry of the Interior for 16 years, when he became a chorus leader. His works include *Étoile* (an operetta); *Roi Malgré Lui* (a comic opera); *Gwendoline;* and *Briseis* (a lyric drama produced posthumously in 1898). Died in Paris, Sept. 13, 1894.

CHACABUCO, a pass in the Chacabuco spur of the Andes, 25 miles N. E. of Santiago, the scene of a battle in the war of Chile for independence (Feb. 12, 1817), which resulted in a victory for the insurgents, and ultimately in their independence.

CHACHAPOYAS, a town in Amazonas department, Peru, on the Utcubamba, 220 miles N. of Lima. It is the see of a bishop, and is well laid out and kept. Elevation, 7,600 feet. In the district is an ancient Indian burial-place, with richly sculptured gates. Population, about 5,000.

CHACO. See Gran Chaco, Vol. XI, p. 46.

CHACORNAC, Jean, French astronomer; born in Lyons, June 21, 1823; died at Villeurbane, near Lyons, Sept. 23, 1873. He was chief astronomer at the Paris Observatory, and gained a reputation by his discoveries of asteroids. The atlas of *Annals of the Observatory of Paris* was entirely his work.

CHAD or CEADDA, Saint, born in Northumbria; became a pupil of St. Aidan at Lindisfarne, and in 666 became Bishop of York. Doubt having been cast on the validity of his consecration, he withdrew in 669, but was immediately made Bishop of Mercia, fixing the see at Litchfield, where his shrine was placed, and the city is full of memorials of him. He died in 672. He became patron saint of medicinal springs; and his canonical day is March 2d.

CHAD, TCHAD, or TSAD, an African lake, about the center of the Sudan. Its area varies with the seasons, from 10,000 to 50,000 square miles. It is shallow and has a large number of islands; is supplied by a great river called the Shari, which flows in from the south. Until lately it was believed to have no outlet; it overflows to the eastward, fertilizing the great wadai, Bahr-el-Ghazal, where the waters, as they approach the arid land of the Sahara, become evaporated. It swarms with tropical animals.

CHADBOURNE, Paul Ansel, educator; born in North Berwick, Maine, Oct. 21, 1823; died in New York city, Feb. 23, 1883. He graduated at Williams College in 1848, and studied theology. He subsequently engaged in teaching, and was tutor at Williams in 1851. In 1853 he was licensed to preach, and in the same year was called to the chair of chemistry and botany at Williams; and when chosen to a similar chair in Bowdoin, he performed the duties of both positions, and held two professorships in medical schools at the same time. He lectured at several colleges and institutes, and conducted scientific expeditions of Williams students to Newfoundland in 1855, to Florida in 1857, to northern Europe and Iceland in 1859, and to Greenland in 1861. In 1867 he became president of the State Agricultural College of Massachussetts, and from 1867 to 1870 was president of Wisconsin University. In 1872 he was chosen president of Williams College, continuing until 1881. The following year he again became president of the Massachusetts Agricultural College. He was a remarkable business man, took considerable part in politics, and was the author of several works, among which are *Natural Theology; Instinct in Man and Animals;* and *Hope of the Righteous.* He edited *Public Service of the State of New York.*

CHADRON, a city, the capital of Dawes Co., Neb., on the Fremont, Elkhorn and Missouri Valley railroad. The government has its land-office for the district — Dawes, Sheridan, and Sioux counties — here, it is also the site of Chadron Academy. It was founded in 1885, and has 5 churches, an academy, a high school, 3 newspaper offices, 4 banks, a packing-house, roller-mills, a foundry, brick-yards, sawmills, a creamery, and marble and broom factories. Iron, lead, silver, coal, gypsum, and excellent marble are found here. Population 1890, 1,867.

CHADWICK, Sir Edwin, a social reformer; born at Manchester, England, Jan. 24, 1801; died at East Sheen, near London, July 5, 1890. He studied law and was called to the bar in 1830. He early devoted his attention to questions of social, sanitary, and political science, and was, by Lord Grey's govern-

ment, appointed an assistant commissioner to inquire into the operation of the poor-laws. His report (1833) laid the foundation of the later systems of government inspection. He became secretary of the Poor Law Board in 1834. His report on interments in towns (1843) laid the foundation of later legislation on the subject. He brought about the sanitary commission and the creation of the office of registrar-general.

CHADWICK, French Ensor, American naval officer, was born in West Virginia in 1844. On Sept. 28, 1861, he was appointed from that state cadet to the Naval Academy, but the Civil War demanding the services of naval officers, he entered the navy two months later (November 28th) as midshipman, serving later as acting volunteer lieutenant. In 1865–66 he was attached to the steam-sloop *Susquehanna*, of the Brazil squadron, becoming ensign in 1866. In 1866–67 he was assigned to the steam-sloop *Juniata*, of the South Atlantic squadron, and was promoted to be master Dec. 1, 1866. He was next assigned to the steam-sloop *Tuscarora*, of the South Pacific squadron, 1868–70, being commissioned as lieutenant-commander Dec. 18, 1868. In 1870–72 he was with the *Guerrière* on the European station. From 1880 to 1882 he was on special lighthouse duty. In 1882–88 he was naval attaché in London, being promoted to be commander Sept. 27, 1884. While in command of the *Yorktown*, when her steering-gear broke during a terrible storm off the Azores, Feb. 13, 1889, he showed his seamanlike qualities by bringing his vessel safely through the tempest, with only a sea-anchor made of a boat filled with water to hold her to her bearing. In 1892–93 he was chief intelligence officer; in 1893–95 chief of the Bureau of Equipment, with the rank of commodore; and on Nov. 7, 1897, he was made captain. During the war with Spain (April–August, 1898), he was in command of the first-class armored cruiser *New York*, Admiral Sampson's flagship, and did excellent service in the blockade of Havana (April–May), the bombardment of the forts at San Juan, Puerto Rico (May 12), and the blockade of Santiago (May–July).

CHADWICK, George W., musician; born in Lowell, Mass., Nov. 13, 1854; studied in Germany under Reinecke and Judassohn; while there composed an overture, *Rip Van Winkle*, which attracted considerable notice. Since his return to the United States in 1880, he has composed a number of symphonies and overtures. He composed the music for the *Columbian Ode* of 1893.

CHADWICK, John White, clergyman; born in Marblehead, Massachusetts, Oct. 19, 1840. He graduated in 1864 from the Harvard Divinity School, was chosen pastor of the Second Unitarian Church of Brooklyn, N. Y., and has become widely known for his radical doctrines and his articles in Unitarian periodicals. He has written *Life of N. A. Staples; A Book of Poems; The Bible of To-day; The Man Jesus;* and *A Daring Faith.*

CHÆREMON, a Greek dramatist who lived at Athens about 380 B. C. The fragments of his writings were published by Bartsh in 1843.

CHÆTODON, a genus of brilliantly colored fishes, with bristle-like teeth, living among the coral reefs of the Atlantic and Pacific. They are good food-fishes.

CHÆTOGNATHA. See Sagitta, Vol. XXI.

CHÆTOPODA. See Annelida, Vol. II, pp. 65–69; Worm, Vol. XXIV, pp. 677–84.

CHAFER, a common name for scarabæid beetles, which, either in the perfect or larval state, are destructive to plants, particularly those which devour the wood, bark, or roots of trees. The word *chafer* is seldom used alone, but generally with some prefix, as rose-chafer, bark-chafer, etc.

CHAFFEE, Jerome Bunty, Senator; born in Niagara Co., N. Y., April 17, 1825; died in Salem Center, N. Y., March 9, 1886. In 1859 became one of the first settlers in Denver, Colorado. Mining ventures brought him wealth, and he was prominent in organizing the territory. He represented it in Congress in 1876, and when it attained statehood, he sat for it in the United States Senate. He was chairman of the Republican National Committee in 1884.

CHAGOS ARCHIPELAGO, a group of islands in the Indian Ocean, south of India, between lat. 6° 40′ and 9° 40′ S., and long. 72° 22′ and 74° 48′ E., a dependency of the British colony of Mauritius; chief product, cocoanut-oil. The largest, Diego Garcia (area 78 sq. m.; pop. 700), is a coaling-station for Australian and Red Sea steamers.

CHAGRIN FALLS, a village of Cuyahoga Co., Ohio, on the Chagrin river; has iron foundries, watermills, and flagstone quarries. Pop. 1890, 1,243.

CHAILLU. See Du Chaillu, *post*, p. 1086.

CHAIN, in surveying, a measure 22 yards long, composed of 100 iron links; called also *Gunter's chain.* See Gunter, Vol. XI; also Vol. XXII, p. 708.

CHAIN-MAIL or CHAIN-ARMOR, an armor much used in the twelfth and thirteenth centuries, consisting of hammered iron links connected into the form of a garment. It was much more flexible and convenient than one formed of steel or brass plates, but was less fitted to bear the thrust of the lance. See Arms and Armor, Vol. II, p. 556.

CHAINS. See Cable, Vol. IV, pp. 621–22; Mechanics, Vol. XV, pp. 738–43.

CHAIN-SHOT, destructive missiles formerly used in naval warfare, consisting of two balls connected by a chain eight or ten inches long, fired collectively from the gun. The chain enabled the balls to catch and destroy objects which otherwise might have escaped.

CHAIRS. See Furniture, Vol. IX, pp. 849–50.

CHALATENANGO, a city of Salvador, capital of Chalatenango province; chief industry agriculture and cattle-dealing. Population, about 6,000.

CHALAZA, in botany, that region of the ovule in which the integuments and nucellus are not differentiated, being the structural base of the ovule. It gradually merges into the stalk (*funiculus*) of the ovule, and is traversed by the fibro-vascular strands coming from the axis.

CHALAZOGAMY, a term in botany applied to those cases in which the pollen-tube does not enter the ovule through the micropyle (the usual entrance), but penetrates the ovule at the chalaza (q. v.). This was first discovered in *Casuarina*, an Australian genus, but has since been found to

occur in species of *Alnus*, *Betula*, *Carpinus*, *Corylus* and *Juglans*, all of which are amentaceous plants. Treub, the original discoverer, considered chalazogamy so important as to form the basis of classification, dividing Angiosperms into two groups: (1) *Chalazogams* (including *Casuarina*), and (2) *Porogams* (including all other Angiosperms). The discovery of chalazogamy, however, in many other species, has thrown discredit upon it as a basis of classification.

CHALCEDONY, a variety of quartz which constitutes the principal part of many agates, and is generally translucent. It is much used in jewelry and ornaments of all sorts. It occurs in old lavas and trap-rocks, and is found in all parts of the world where these exist. See AGATE, Vol. I, p. 277; MINERALOGY, Vol. XVI, p. 389.

CHALCEDONYX, a name given to agates formed of cacholong, or a white opaque chalcedony, alternating with a grayish translucent chalcedony.

CHALCHIHUITL, the Indian name of a bluish-green stone, taken from a quarry near Santa Fé, New Mexico, and by some regarded as a species of turquoise, by others identified with jade. It was valued above gold by the ancient Mexicans, who fashioned it into beads and ornaments. See JADE, Vol. XIII, p. 540.

CHALCIDIDÆ, a small family of short-tongued lizards, natives of tropical America. See LIZARDS, Vol. XIV, p. 733.

CHALCIS, a city of Eubia. See EUBIA, Vol. VIII, p. 649.

CHALCOCONDYLES, DEMETRIOS, a writer in modern Greek. See GREECE, Vol. XI, p. 149.

CHALDER OR CHALDRON, an English dry measure formerly used for any dry goods, but now confined exclusively to coal and coke. It was of uncertain quantity formerly, varying from 60 to 70 bushels. To-day it varies in value from 2,500 to 3,000 pounds. In the terms of the old system it was equal to 12 quarters Winchester measure, or 16 bolls.

CHALDÆA. See BABYLONIA, Vol. III, pp. 183 et seq.

CHALDEE, a language. See ARAMAIC LANGUAGE, Vol. II, p. 307.

CHALEUR BAY, an inlet of the Gulf of St. Lawrence, Canada, having the bold shore of Quebec on the north and New Brunswick on the south. It measures 90 miles from east to west and is from 20 to 25 miles wide; is everywhere deep and well sheltered, and is much frequented for its mackerel-fisheries.

CHALICE, an ancient name for an ordinary drinking-cup, but now only applied to the cup in which the wine of the holy sacrament is administered. See PLATE, Vol. XIX, pp. 185, 186.

CHALLEMEL-LACOUR, PAUL ARMAND, French statesman; born in Avranches, May 19, 1827; became a college professor and was banished by Napoleon III after the *coup d'état*. He was a strong Republican, and lectured on the continent of Europe on political, social, and scientific subjects; returned to France after the amnesty of 1859 and established the *Revue Politique*, in which he had Gambetta and Brisson as collaborators. After the downfall of the empire, he was made prefect of the Rhône. He was elected to the Chamber as a Radical in 1872, and in 1876 became a senator. In 1879 he was sent as ambassador to Switzerland, and from June, 1880, until February, 1882, represented France in London. In 1883 he became Minister of Foreign Affairs.. He founded the *République Française*. In March, 1893, he was elected to the Academy, and to the presidency of the Senate. He died in Paris, Oct. 26, 1896.

CHALLENGER EXPEDITION. See DREDGE, Vol. VII, pp. 462, 463; THOMPSON, SIR CHARLES WYVILLE, Vol. XXIII, p. 311.

CHALYBEATE WATERS. See MINERAL WATERS, Vol. XVI, pp. 434–436.

CHAM, the pseudonym assumed by the caricaturist, Amédée de Noé; born at Paris, April 26, 1819; died there, Sept. 6, 1879. He studied art under Delaroche, and soon acquired a great reputation as a skillful and witty delineator of the humorous side of Parisian life. In 1834 he began his famous connection with the *Charivari*, in which paper and in the *Journal des Pélerinages* he continued to delight his fellow-citizens until close upon his death. Two collections of his sketches have been published, *Douze Années Comiques* and *Les Folies Parisiennes*.

CHAMÆROPS, a genus of palms with fan-shaped leaves, less exclusively tropical than palms in general. Two species are known, both belonging to the Mediterranean region, *C. humilis* being the only indigenous palm of Europe. They are known as "dwarf-palms." The leaves are employed for various useful purposes, as for thatching, hats, cordage, chair-bottoms, brooms, pasteboard, paper, etc. See PALM, Vol. XVIII, pp. 189, 190.

CHAMALHARI, a peak of the Himalayas, 23,944 feet high, between Tibet and Bhutan, 140 miles E. of Mount Everest.

CHAMBERLAIN, DANIEL HENRY, a governor of South Carolina; born in West Brookfield, Massachusetts, June 23, 1835; graduated at Yale in 1862, and the Harvard Law School in 1863. The following year, as lieutenant of a Massachusetts colored regiment, he entered the army, serving in several of the Southern states. He engaged in cotton-planting in South Carolina after the war; was appointed delegate to the constitutional convention of 1868, and elected attorney-general of the state. In 1874 the Republicans elected him to the office of governor, and in 1876 he was re-elected, but the result was opposed and questioned by the friends of the defeated candidate, Wade Hampton, and after holding office for three months, Governor Chamberlain resigned and went to New York City, where he resumed his legal work.

CHAMBERLAIN, JOSEPH, statesman; born in London in July, 1836, and educated at University College. He joined the firm of Nettlefold & Co., screw-makers of Birmingham, and for many years

devoted himself almost entirely to business. Elected mayor of Birmingham in 1873, re-elected in 1874 and again in 1875, his term of office was remarkable for the expeditious dispatch of corporate business. About this period his name was brought prominently before the public by several articles written by him for the *Fortnightly Review*, in which he expressed very advanced political and educational views. In 1876 Mr. Chamberlain was elected member of Parliament for Birmingham without opposition, and from that date his career is to be traced in Parliament and on the public platform. On the return of the Liberals to power in 1880, he was appointed president of the Board of Trade, with a seat in the Cabinet. His influence as a political leader increased rapidly outside of the House, and on his exit from office in 1885 he was elected for the western division of Birmingham, and held the office of president of the Local Government Board until his divergence of views on the Irish policy of Mr. Gladstone caused his resignation (March, 1886). He was subsequently appointed British commissioner to the conference at Washington for the settlement of the fishery disputes between Canada and the United States. He revisited the United States on the occasion of his marriage with Miss Endicott (Nov. 15, 1888). In 1892 he was chosen leader of the Liberal-Unionists. He took office under Lord Salisbury, in a Tory Cabinet, as Colonial Secretary. His policy has been characterized by a constant desire to improve the condition of the working classes and by his advocacy of imperial federation of the home government and all the colonies. His masterful conduct (1895–96) of the intricate and awkward position of the government, owing to the Jameson raid into the South African Republic, made him one of the most prominent men of the time in the British Empire.

JOSEPH CHAMBERLAIN.

CHAMBERLAIN, Joshua Lawrence, soldier and educator; born in Brewer, Maine, Sept. 8, 1828. He graduated at Bowdoin in 1852, and at Bangor Theological Seminary three years later. From 1856 to 1865 he held professorships in Bowdoin College, with the exception of the time of the Civil War, during which he served gallantly, being several times wounded; was promoted, on the field, brigadier-general by General Grant, and was brevetted major-general. He was elected governor of Maine in 1866 and served till 1871, being then chosen president of Bowdoin College, holding this office till 1883. In 1876 he was elected major-general of the state militia.

CHAMBERLAIN, Sir Neville Bowles, British general; born at Rio, Brazil, Jan. 18, 1820; entered the Indian army in 1836; in 1843 became deputy quartermaster-general to the army in India; in 1856, adjutant-general of the Bengal division; lieutenant-general in 1872; commander-in-chief of the Madras army in 1875; general in 1877. He retired in 1886.

CHAMBERLAIN, Thomas Chrowder, geologist; born at Mattoon, Illinois, Sept. 25, 1843; was graduated at Beloit College in 1866; from 1869 to 1873, professor of natural science at the Wisconsin State Normal School; from 1873 to 1884, professor of geology at Beloit; in 1887, president of the University of Wisconsin, which position he held until 1892, when he became head of the geological department at the University of Chicago.

CHAMBERS, private rooms attached to most of the courts, in which the judges and chief clerks transact a large amount of judicial business. Counsel attend in chambers only in matters which are not required to be done in open court.

CHAMBERS, Charles Julius, an American journalist; born at Bellefontaine, Ohio, Nov. 21, 1850, graduated at Cornell in 1870; became special correspondent in the West Indies, Europe, Canada and the United States for the New York *Herald;* equipped a canoe expedition to Lake Itasca in 1872; and in 1875 simulated insanity, and was incarcerated for several weeks in an insane asylum, for the purpose of ascertaining how such people are treated. He is a contributor to current literature, and has published *A Mad World; On a Margin;* and *Lovers Four and Maidens Five.*

CHAMBERS, Robert William, an American author; born in New York in 1865, the son of a prominent member of the New York bar. In 1885 he went to Paris to study art, exhibiting in the Salon of 1889, and in eight years spent in Europe gathering the material for his future works. His *Red Republic*, a vivid, realistic, and in some ways the most valuable, account of the Commune that has been written, was one of the results of his visit to Europe. His first story, *In the Quarter*, was published in 1894, followed by *The King in Yellow*, a collection of remarkable short stories issued in the same year. Their power and originality was unmistakable. A vein of weirdness running through them all challenged attention and caused some of the critics to call him a decadent. Then came *A King and a Few Dukes* and *The Maker of Moons*, the latter a collection of eight remarkable short stories. *The Red Republic* and *The Ashes of Empire* (1898), coming after these, established Mr. Chambers's position as a writer of fiction of considerable merit.

CHAMBERS, Talbot Wilson, an American divine; born in Carlisle, Pennsylvania, Feb. 25, 1819, graduated at Rutgers in 1834, and studied theology, being licensed to preach in 1838, and ordained to the pastorate of the Second Reformed Dutch Church, in Somerville, New Jersey. In 1850 he became pastor of the Collegiate Dutch Church of New York City. He was on the American committee which revised the Old Testament. His works include *The Noon Prayer-Meeting in Fulton Street* (1857); *Memoir of Theodore Frelinghuysen; The Psalter a Witness for the Divine Origin*

of the Bible (1876); and *A Companion to the Revised Version of the Old Testament* (1885). Died in New York, Feb. 3, 1896.

CHAMBERS, WILLIAM, publisher; born April 16, 1800, at Peebles, Scotland; died in Edinburgh, May 20, 1883. Owing to his father's misfortune, his schooling terminated with his thirteenth year. The family migrated to Edinburgh in 1813, and next year William was apprenticed to a bookseller. When his five years were up he started business in an humble way for himself. Between 1825 and 1830 he wrote the *Book of Scotland*, and in conjunction with his brother Robert (see Vol. V, p. 380) a *Gazetteer of Scotland*. His experience gained as a bookseller and printer resulted in the founding of *Chambers's Edinburgh Journal* in 1832. This was about six weeks in advance of the *Penny Magazine*, and may be considered the pioneer of that class of cheap and popular periodicals of a wholesome kind now so generally diffused. At the end of the fourteenth number he united with his brother Robert in founding the business of William and Robert Chambers, in which they were associated in writing, editing, printing and publishing. W. and R. Chambers issued a series of works designed for popular instruction, including, besides the *Journal*, *Information for the People* (2 vols.); the "Educational Course" series; *Cyclopædia of English Literature* (2 vols.); *Miscellany of Useful and Entertaining Tracts* (20 vols.); *Papers for the People* (12 vols.); and the *Encyclopædia* (10 vols.; 1859–68; new ed. 1888–92).

In 1859 William founded and endowed an institution in his native town for purposes of social improvement. Twice elected lord provost of Edinburgh, he occupied that office for four years, during which he promoted several important public acts, including one for the improvement of the older part of the city, which has resulted in a great diminution of the death-rate. He also carried out, at his own cost, a thorough restoration of St. Giles' Cathedral. He died May 20, 1883, shortly after being offered a baronetcy. He was made LL.D. of Edinburgh in 1872. A statue has been erected to his memory in Edinburgh. Besides many contributions to the *Journal*, he was author and editor of various volumes, and wrote the *Youths' Companion and Counsellor; Ailie Gilroy; Stories of Remarkable Persons;* and *Historical Sketch of St. Giles' Cathedral.*

CHAMBERS, WILLIAM SIR (1726–96), an architect of Scotch origin, and writer on *Civil Architecture*. See ARCHITECTURE, Vol. II, p. 444.

CHAMBERS OF COMMERCE, organizations of merchants for the promotion of trade; for collecting statistics bearing upon staple articles of trade; for aiding to secure legislation affecting trade, and, sometimes, to act as courts of arbitration in mercantile disputes. The first chamber of commerce is said to have been founded in Marseilles, France, in the beginning of the fifteenth century. Its functions included a share in municipal administration of justice, as well as regulating trade. It was several times suppressed, and not till 1650 did its powers become fixed. Nearly two centuries later, the first chamber of commerce in Great Britain was established at Glasgow, being incorporated in 1783. In the New World the first organization of this character was the New York Chamber of Commerce, organized April 5, 1768, incorporated by royal charter, March 13, 1770; reincorporated by the state, April 13, 1784. Its first important action was to petition the state legislature, in 1784, to change the method of imposing tariff on imports from *ad valorem* to specific duties, its petition being granted. In 1786 it first suggested the construction of the Erie canal. Its membership at date of organization was 20; in 1896 there were 1,000 regular members, the initiatory fee being $25. It was then composed of members of the various "exchanges" in the city, the principal ones being the *Mercantile*, *Coffee*, *Cotton*, *Metal*, *Coal and Iron*, *Real Estate*, *Building Material*, *Horse* and *Produce* exchanges. The *New York Produce Exchange*, housed in its own stately building at the head of Whitehall Street, was formally organized in 1868, being the outgrowth of the former Merchants' Exchange, the Corn Exchange and the old Produce Exchange. In 1884 they completed their new "Temple of Commerce," a building 300 by 150 feet ground dimensions, 116 feet high, with a tower 225 feet high, in all costing over $3,000,000. Its membership is 3,000 (the full limit allowed by the rules of the exchange), new members coming in only by purchase of certificates vacated by death or otherwise, the price of vacated certificates ranging from $3,000 to $5,000.

Similar organizations, which exist in all the principal cities of the United States, are variously known as boards of trade, merchants' exchanges, etc. The Chicago Board of Trade, which owns a handsome stone structure at the head of La Salle street, was organized March 13, 1848, by thirteen of the leading firms of the young city; was incorporated in March, 1859, and in 1896 had 1,850 members. The initiatory fee for new members is $10,000, virtually prohibitory, but individual memberships are bought, sold and transferred, the values fluctuating at about $600 to $700.

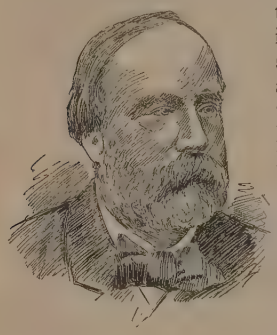
CHAMBERSBURG, a town and the capital of Franklin County, central southern Pennsylvania, situated on the east bank of the Conococheague Creek, about 50 miles S.W. of Harrisburg, on the Chambersburg and Gettysburg and the Western Maryland railroads. It is the seat of Wilson College, and of a great variety of manufacturing industries. Population 1890, 7,863.

CHAMBESI OR CHASI, an African river which rises on the southern plateau between lakes Tanganyika and Nyassa and flows southeast for about 300 miles into Lake Bangweoli, but when this lake disappears in the dry season, it flows through the lake bed into its outlet, the Luapula River. This river carries the waters north into the Lualaba, which conducts them to the Congo. See ZAIRE, Vol. XXIV, p. 763.

CHAMBLY, a small county in the southern part of the province of Quebec, opposite Montreal, on the St. Lawrence. Capital, Longueuil. Chief products, oats, hay, wool, flax and tobacco. Area, 157 square miles. Population, 10,958.

CHAMBLY, FORT, was situated on the Richelieu River, at the rapids, 12 miles below St. John. In 1775 this was a British post, and General Carleton, thinking it sufficiently safe, left only a small garrison there. General Montgomery, who was at the time besieging St. John, aided by some Canadian scouts, surprised and captured the town after a short fight. A large amount of ammunition was captured; the surrender of St. John was hastened by the capture of this fort.

CHAMBORD, HENRI CHARLES DIEUDONNÉ, COMTE DE, and DUC DE BORDEAUX, claimant to the French throne; born in Paris, Sept. 29, 1820, seven months after the assassination of his father, the Duke de Berri. His original title, Duc de Bordeaux, was dropped by him in 1844 and that of Chambord taken, in honor of the chateau of Chambord, presented to him by the Legitimists. Charles X, his grandfather, abdicated in his favor in 1830. The elder Bourbons were at that time driven into exile. He assumed the title "Henry V," and at various times made futile attempts to regain the throne. He lived in exile all his life. He was a man of considerable ability, but lacked decision. He married the Princess of Modena in 1836, but had no children. He died at Frohsdorf Castle, Lower Austria, Aug. 24, 1883.



COMTE DE CHAMBORD.

CHAMBRE ARDENTE (fiery chamber), a name given at different times, in France, to an extraordinary court of justice, probably on account of the severity of the punishments which it awarded, the most common being that of death by fire. In 1535 Francis I established an inquisitorial tribunal and a *chambre ardente*. Both were intended for the extirpation of heresy. The former searched out cases of heresy and instructed the processes, while the latter both pronounced and executed the final judgment. The *chambre ardente* was made use of until 1682. Its last victim was Voisin, charged with sorcery in 1680.

CHAMFER OR CHAMPFER. See ARCHITECTURE, Vol. II, p. 462.

CHAMPAC OR CHAMPAK, an Indian tree (*Michelia champaca*), family *Magnoliaceæ*, possessing great beauty both of foliage and flowers, and held in high esteem by Brahmins and Buddhists. It is planted about their temples, and images of Buddha are made of its wood. Its beautiful yellow flowers and their sweet perfume are much celebrated in the poetry of the Hindus. The timber of this and other species is useful and fragrant, and the bark and root are employed in native medicine.

CHAMPAGNE WINES. See WINES, Vol. XXIV, pp. 605, 606.

CHAMPAIGN, a city of Champaign County, central eastern Illinois, 128 miles S.S.W. of Chicago, in the midst of a rich agricultural region, on the Illinois Central, the Wabash, and the Cleveland, Cincinnati, Chicago and St. Louis railroads. It is beautifully laid out, with broad, shaded streets and numerous parks; it has electric and gas lights, water-works, and electric-car lines, and a large number of factories, chiefly of ropes and twines. The University of Illinois is located here. Population 1890, city, 5,839; township, 6,619.

CHAMPERTY is a bargain with a party to a suit, or having a right of action, for part of the property or other matter sued for in case the suit is successful, whereupon the champertor is to maintain the suit at his own expense. A contract between an attorney and his client, that the attorney will maintain a suit at his own expense for a share of the amount recovered, in some states is held champertous, and cannot be enforced. Champerty is an offense indictable at common law. The offense consists of the tendency of such contracts to stir up and encourage strifes and litigation. Any interest in the subject-matter by the party who undertakes to maintain the suit, however slight, will avoid champerty. See BARRATRY and MAINTENANCE, in these Supplements.

CHAMP DE MARS of to-day is one of the public parks of Paris, situated between the Military School and the Seine. It is about three quarters of a mile in length by a little over a quarter of a mile in width. Here are held all outdoor meetings, military reviews and public ceremonies. During the Revolution and the first empire many celebrations were held here. The Paris international exhibitions of 1867, 1878 and 1889 were held in this park. It derives its name both from the march-fields, or camps for the discussion of public affairs, of the Frankish rulers of the fifth and sixth centuries and from the Roman Campus Martius, which had a similar use.

CHAMFLEURY. See FLEURY, JULES F. F. H., in these Supplements.

CHAMPIGNY, a village on the Marne River, a short distance E. of Paris. Here, on the 30th of November and 2d of December, 1870, during the siege of Paris, occurred a desperate conflict between the French and Germans, in which the French were driven back across the Marne.

CHAMPION. In the judicial combats of the middle ages, women, children, priests and aged persons were allowed to appear in the lists by a representative, and such hired combatant was called a champion (see ORDEAL, Vol. XVII, p. 820). In the age of chivalry it signified a knight who entered the lists on behalf of any one incapable of self-defense. In England the crown has its champion, who, mounted on horseback, and armed to the teeth, challenges, at every coronation at Westminster, all who should deny the

king to be the lawful sovereign. This officer is a member of the Lord Chamberlain's department, and the office is hereditary.

CHAMPION HILLS, Hinds County, central western Mississippi, 20 miles W. of Jackson, was the scene of a severe conflict between General Grant's army and the Confederates under General Pemberton. General Grant was advancing upon Vicksburg, when he was met at this point by the Confederate force. The battle which ensued lasted five hours, and resulted in the retreat of the Confederates to the Big Black River, with heavy losses of men and artillery. It was fought May 16, 1863, and is sometimes called the battle of Baker's Creek.

CHAMPLAIN, a town of Clinton County, northwestern New York, on the Chazy River and on the Central Vermont railroad, 19 miles N. of Plattsburg. The river is navigable, and is used for exporting lumber. The town is the seat of the Champlain Academy. Population in 1890, 1,275.

CHAMPLAIN, a town in a county of the same name, Quebec, Canada, about 58 miles S. of Quebec City, on the Canadian Pacific railroad. The county contains about 30,000 inhabitants; area, 9,150 square miles; chief product, lumber. The town has about 2,000 inhabitants.

CHAMPLAIN FORMATION. See GEOLOGY, Vol. X, pp. 369, 370.

CHAMPLIN, JAMES TIFT, educator; born in Colchester, Connecticut, June 9, 1811; died in Portland, Maine, March 15, 1882. He graduated with the first honors in the class of 1834 at Brown University, taught there for three years, was pastor of a Baptist church in Portland, Maine, from 1838 to 1841; was called to a professorship of Waterville (now Colby) University, and became president there in 1857, serving till 1873. He edited *Demosthenes on the Crown; Demosthenes' Select Orations; Æschines on the Crown;* and published educational works, such as the *Text-book of Intellectual Philosophy; First Principles of Ethics;* and *Constitution of the United States, with Brief Comments.*

CHAMPLIN, JOHN DENISON, author; born in Stonington, Connecticut, Jan. 29, 1834; was graduated at Yale in 1856; studied law, and went into practice in New York City. He was connected with the Bridgeport *Standard* and *The Sentinel* until 1869. He edited *Fox's Mission to Russia,* and aided in compiling the *American Cyclopædia.* He contributed the article on HAYTI to this ENCYCLOPÆDIA. Among his best-known published writings are *Child's Catechism of Common Things; Young Folks' History of the War for the Union; The Chronicle of the Coach,* a description of a coaching trip in England with Andrew Carnegie; and, with C.C. Perkins, *Cyclopædia of Painters and Paintings.*

CHAMPLIN, STEPHEN, naval officer; born in South Kingston, Rhode Island, Nov. 17, 1789; died in Buffalo, New York, Feb. 20, 1870. When 16 years of age he went to sea, and at 23 years of age engaged in the naval operations of the War of 1812. He commanded successively the ship *Scorpion,* the prize-ships *Queen Charlotte* and *Detroit,* the *Tigress,* the schooner *Porcupine,* the receiving-ship *Fulton,* and the *Michigan.* In 1855 he was placed on the retired list, and in 1862 promoted to the rank of commodore. He was the last survivor of the battle of Lake Erie.

CHAMPNEY, JAMES WELLS, artist; born in Boston, Massachusetts, July 16, 1843; served for a short time as volunteer in the Forty-fifth Massachusetts regiment. He taught drawing, and spent several seasons in Europe studying art, his first teacher being Édouard Frère of Paris. He is a member of the American Water-Color Society, and an associate member of the National Academy. His paintings include *Which is Umpire? Indian Summer; Boarding School Green-Room; He Loves Me; Griselda;* and *Song Without Words.*—His wife, LIZZIE WILLIAMS (born in Ohio in 1850), is a clever writer, and the author of charming books. Beside the "Vassar Girl" series, she has written *In the Sky-Garden; All Around a Palette;* and *Sebia's Tangled Web.* Her husband has illustrated many of her books.

CHAMPNEYS, BASIL, an English architect; born in 1842 at Lichfield; was graduated at Trinity College, Cambridge, in 1864; studied architecture under Prichard. He designed many of the buildings at Cambridge, Oxford and other schools. He was architect of St. Luke's Church, Kentish Town, and other churches, aided in the restoration of St. Bride's, in Fleet Street, St. Dunstan's in Stepney, and was the author of *A Quiet Corner of England* (1875).

CHANAK-KALESSI, a town of Anatolia, southwestern Asia Minor, situated on the Dardanelles, about 28 miles S.W. of Gallipoli. It derives its name from its manufactures of crockery. Population, 6,000.

CHANCEL, the space in the Roman Catholic and Anglican Episcopal churches that is inclosed and railed off from the choir, reserved for the clergy; includes the altar, and is often called the sanctuary. The chancel was, and still is in some churches, separated from the nave by a screen of lattice-work, so as to prevent general access thereto. Frequently this screen bore a carved representation of the crucifixion, and was then termed the rood-screen. It is generally elevated from the body of the church by a few steps.

CHANCELLOR, CHARLES WILLIAMS, physician; born in Spottsylvania County, Virginia, Feb. 19, 1833; was graduated at Jefferson Medical College, Philadelphia, in 1853. In 1861 he joined the Confederate army and became medical director for the division under General Pickett. After the war he settled in Memphis, Tennessee, and remained there until 1868, when he went to Baltimore, Maryland, to act as professor of anatomy in Washington University. He was transferred to the chair of surgery in 1870, but resigned in 1873. He was secretary of the state board of health in 1876, and in 1877 was president of the state insane asylum. His writings on medical topics are of much value. Among them are *Cou-*

tagious and Infectious Diseases; Drainage of the Marshlands of Maryland; Heredity; and *Sewerage of Cities.*

CHANCELLOR. A chancellor is the officer who presides over a court of chancery, corresponding to the judge in a court of law. He is usually a judge who is selected by the other judges of the judicial district to sit as a chancellor, or by some other authority has the right to act in that capacity. A chancellor of a university is the chief officer of the institution, but is for the most part an honorary officer. See CHANCELLOR, Vol. V, pp. 387–389.

CHANCELLORSVILLE, a plantation in Spottsylvania County, northeast Virginia, 65 miles N.W. of Richmond. Here was fought a battle between the Federal forces under General Hooker and the Confederates under General Lee, May 2–4, 1865. The Union army was defeated, sustaining a terrible loss. The fighting of this battle, and the evident mistakes in generalship displayed by Hooker, brought out the condemnation of the majority of the people of the North, and did much toward causing him to resign his command. Hooker succeeded Burnside in the command of the army of the Potomac after the defeat at Fredericksburg in December, 1862. The army at that time was completely demoralized by the many desertions and the great amount of sickness. He spent the winter in reorganizing and recruiting. When spring came he had 132,000 men in excellent condition, including 12,000 cavalry. Lee, on the other hand, although his men were enthusiastic from the victories of the previous campaign, had but 60,000 men, and was in possession of about the same position occupied by him at the battle of Fredericksburg. Hooker decided upon a flank movement, rather than a direct assault. He began the work of attack April 13th, but heavy rains and consequent swollen streams prevented progress before the 29th. Then Stoneman, in command of the cavalry, was sent across the Rappahannock to gain the rear of the Confederates. At the same time, the First Corps under Reynolds, the Third under Sickles, and the Sixth under Sedgwick, were moved against Lee's right wing, near Fredericksburg. At that time another division, under Slocum, was to turn the other flank, while Hooker was between the two with a strong force. Lee up to this time had not been able to discern the purpose of the Federals, but he soon realized that the main attack was to be directed against his left, so he concentrated his forces in that direction. Had Hooker continued in his flank movement, it is possible that the outcome of the battle would have been different, but just at the time for the attack as had been agreed upon, he sent peremptory orders for all to retire toward Chancellorsville. This was a fatal mistake, owing to the disadvantageous position in which the troops were placed and the effect the retreat had upon the minds of the men. He massed his forces about the Chancellor House in the form of a letter J, with Meade in command of the left, Howard the right, Slocum and Sickles between, and Hancock toward the east. Lee first attacked Hancock, but soon changed to Howard, and with the troops under "Stonewall" Jackson drove Howard back upon Hooker in the center. Lee himself kept Meade from going to Howard's relief. Again Hooker concentrated his forces. In the next day's battle Lee united all his forces and drove Hooker from his position, leaving Sedgwick in a perilous situation. Lee attacked Sedgwick, who had defeated Early, and forced the Federals back across the Rappahannock. Defeated on every side, Hooker called a council of his officers, and, contrary to their almost unanimous advice, decided to continue the retreat, and thus gave Lee and his troops an opening and confidence for the Gettysburg campaign. Hooker lost, during the three days' fighting, over sixteen thousand men, and the Confederates twelve thousand. During the battle "Stonewall" Jackson, thought by some the greatest of the Confederate generals, was killed. His loss was irreparable. In the eyes of most military critics, the entire campaign was an uninterrupted series of blunders on the part of Hooker, who was wounded during the fight, and his strange conduct of the battle and the ordering of the retreat are excused by some on that account.

CHANDAUSI, a town of the northwest provinces of India, 27 miles S. of Muradabad, on the Burjeb and Delhi railroad. Population, 27,521.

CHANCROID, a disease. See SURGERY, Vol. XXII, p. 686.

CHANDELEUR ISLANDS, a semicircular chain off St. Bernard County, southeastern Louisiana, about 20 miles from shore. They separate Chandeleur Sound from the Gulf of Mexico. The northernmost has at its northern extremity a lighthouse 56 feet high; lat. 30° 3′ 8″ N., long. 88° 51′ 38″ W.

CHANDERI OR CHANDHAIREE, a town of Gwalior, central India, 105 miles S. of the city of Gwalior, once a flourishing manufacturing center and an almost impregnable fort. It is now much decayed, on account of oppression and wars, but the beauty and extent of its ruins show its former importance and splendor. It is said to have contained at one time 14,000 stone houses, 384 markets, 360 caravansaries and 12,000 mosques. It is under British rule. Population 1891, 5,100.

CHANDERNAGAR, a French settlement in Bengal. See CHANDARNAGAR, Vol. V, p. 391.

CHANDLER, CHARLES FREDERICK, an American chemist; born in Lancaster, Massachusetts, Dec. 6, 1836. He pursued scientific studies at Harvard and at foreign universities, and on his return to America was for seven years professor of chemistry in Union College. He was then employed in the organization of the Columbia School of Mines in New York City. Since that time he was connected with the college, holding the chair of chemistry in that institution and in the New York College of Pharmacy. He has also been chemist to the Metropolitan Board of Health, and in 1873 was appointed president. In the College of Phy-

sicians and Surgeons he was, in 1876, appointed professor of chemistry and medical jurisprudence. As officer of the board of health, Mr. Chandler has given attention to the subject of food-adulteration, has compelled the location of slaughter-houses to be along a narrow area on the river side, and has obtained the passage of the tenement house act, which provides that the plans for such buildings be submitted to the health board. Aside from the reformatory work which he has accomplished for New York City, he has analyzed the waters of several springs, has lectured frequently, and has investigated the water-supply of Albany, New York, and other cities. He was a member of several scientific societies, both at home and in Europe. Reports of his investigations have been published, many of them appearing in the *American Chemist*, a periodical established in 1870 by himself and his brother, William Henry Chandler. The latter was a well-known chemist, and has been professor of this science at Columbia School of Mines (1868–71) and at Lehigh University. He was a juror at the United States Centennial Exhibition of 1876, and at the Paris exhibition two years later.

CHANDLER, John, a United States Senator from Maine; born in Epping, New Hampshire, in 1760; died in Augusta, Maine, Sept. 25, 1841. He learned the blacksmith's trade, became a member of Congress from 1805 till 1808, took part in the War of 1812 as brigadier-general, was United States Senator from Maine from 1820 to 1829, and from 1829 till 1837 collector for the United States for the Portland district.

CHANDLER, Joseph Ripley, an American philanthropist and diplomat; born in Kingston, Massachusetts, Aug. 25, 1792; died in Philadelphia, Pennsylvania, July 10, 1880. For several years he taught a successful school in Philadelphia; in 1822 became interested in the *United States Gazette*, which afterward, in 1847, became the *North American*. From 1849 to 1851 he was a member of Congress, representing the Whig party. In 1858 he was sent by President Buchanan as minister to the Two Sicilies. He published an English grammar and many addresses, and was interested in the subject of prison reform.

CHANDLER, Ralph, an American naval officer; born in New York, Aug. 23, 1829; died Feb. 11, 1889, in Hongkong, China. He began his naval career as a midshipman, attaining to the rank of rear-admiral. He took part in the Mexican and Civil wars, conducted several coast surveys, was in charge of the Brooklyn navy-yard, took part in scientific expeditions to Tasmania and elsewhere, and was in command of the Asiatic squadron at the time of his death.

CHANDLER, Seth C., an American astronomer; born Sept. 16, 1845, in Boston, Massachusetts. While a student at Harvard College he invented the almucantar, an astronomical instrument floating on mercury and bearing a telescope that always points to the same altitude. He is a recognized authority on variable stars. He attracted considerable attention in 1889 by his conclusion that Brook's comet was identical with the Lexell comet of 1770. In his investigations of variable stars he discovered a relation between the depth of color and the length of period of the star.

CHANDLER, William Eaton, a United States Senator from New Hampshire; born in Concord, New Hampshire, Dec. 28, 1835; was graduated at Harvard Law School in 1855, and in 1862 was elected to the New Hampshire house of representatives, of which he was speaker in 1863–64. He held various positions under the United States, including that of first assistant secretary of the Treasury, and was active in politics, attending all important conventions.

WILLIAM E. CHANDLER.

From 1868 to 1876 he served as secretary of the Republican National Committee. On March 23, 1885, he was nominated for Solicitor-General of the United States, but the Senate refused to confirm him. In April, 1882, he became Secretary of the Navy, and held that office until March, 1885. In June, 1887, he was elected to fill a vacancy in the United States Senate, and was re-elected in 1889 and 1895.

CHANDLER, Zachariah, a United States Senator from Michigan; born in Bedford, New Hampshire, Dec. 10, 1813; died in Chicago, Illinois, Nov. 1, 1879. He received a common school education, and went to Detroit in 1833, where he established himself in the dry-goods business. His energy brought success, while the same spirit in political matters soon made him prominent as a Whig and an active supporter of the "underground railroad," of which Detroit was a terminus. In 1851 he was elected mayor of the city, and the following year was an unsuccessful candidate for the office of governor. In 1857 he succeeded General Lewis Cass in the United States Senate, and remained in this official body till his death, with the intermission of the years between 1875 and 1879. Senator Chandler took an active part in debates of Congress, opposing the admission of Kansas under the Lecompton constitution, advocating the war in defense of the Union, and insisting that the short term of enlistment for the volunteers first called for was a mistake; he also favored a sweeping confiscation bill the stern measures of which would deter wavering persons from taking arms against the government. In 1874 President Grant offered him the position of Secretary of the Interior, which office he held till Mr. Hayes was inaugurated. He was chairman of the Republican National Committee in 1868 and in 1876.

CHANDOS, the name of an English family descended from a follower of William the Conqueror, the last representative in the direct male

line being Sir John Chandos (died 1428), whose sister married Giles Brydges. Their descendant, Sir John Brydges, was lieutenant of the Tower under Queen Mary, and was created Baron Chandos in 1554. James Brydges (1673–1744), eighth Lord Chandos, sat in Parliament for Hereford from 1698 to 1714, and was created Duke of Chandos in 1719. In 1796 the title passed by marriage to the family of Grenville, the present dukes of Buckingham and Chandos.

CHANEY, Henry James, British physicist; born in Windsor, England, in 1842; superintendent of standards for the Board of Trade. He was active in bringing about the adoption of international standards of weights and measures, and in the enactment of the British laws regulating such standards. He published *Verification of Parliamentary Standards of Length and Weight; Mode of Testing Weighing Machines; Redetermination of the Scientific Unit of Volume*; and many other papers on kindred topics.

CHANG and ENG. See Siamese Twins, in these Supplements.

CHANGARNIER, Nicolas Amie Théodule, a French general; born at Autun, France, April 26, 1793; died at Versailles, Feb. 14, 1877. He distinguished himself in the Algerian campaigns from 1830 to 1847, and became general of division and maréchal-de-camp. In May, 1848, he succeeded Cavaignac as governor-general of Algeria. In the same year he was recalled and became commander-in-chief of the national guard of Paris. Louis Napoleon, then prince-president, deprived him of his command in January, 1851, and at the *coup d'état* of December 2d of that year he was arrested and exiled. During the Franco-Prussian war he offered his sword to France, was made a general, and sent to Metz. He strenuously opposed the surrender of that fortress and of Bazaine's army, but was overruled. After the war he became a senator.

CHANG-CHAU, a town of the province of Fuh-Reen, southeastern China, on a branch of the Kiulung-Kiang, 35 miles W. of Amoy. The city is well built, but dirty; it is surrounded by a wall 4½ miles in circumference. The river is crossed by a bridge 780 feet long, which is supported on 25 stone piles about 31 feet apart. In the city is a magnificent Buddhist temple, built in the eighth century. There is a large silk trade in the city, and it has manufactories of sugar, paper and porcelain. These articles and tea are its principal exports. Population, about 900,000.

CHANGE OF VENUE is the change of the place of trial of a suit to another county or to another court of like jurisdiction in the same county. The rule is, that if the venue is changed the case must go to the nearest county, or if to another court in the same county, then to the nearest of such courts to that in which the suit is brought. The usual grounds for changing the venue are, that the judge of the court wherein the suit was brought is disqualified to try the case, through interest in the result or prejudice against the defendant, or that on account of the prejudice of the citizens of that county a jury cannot be procured who will give a fair and impartial verdict. The right to a change of venue is governed by statute in the various states.

CHANG SHA FOO, a city of southern China; capital of the province of Hunan, on the Siang Kiang, about 360 miles N. of Canton. Its chief industry is silk manufacture and trade. Population, 300,000.

CHANK-SHELL, a gasteropod mollusk of the genus *Turbinella*, occurring in Indo-Pacific waters. It is the sacred shell of the Hindus. Many are brought to America and Europe for ornamental purposes.

CHANLER, Mrs. Amélie. See Rives, in these Supplements.

CHANNING, Edward Tyrrel, an American educator and scholar, brother of Rev. William Ellery Channing; born Dec. 12, 1790, in Newport, Rhode Island; died Feb. 8, 1856, at Cambridge, Massachusetts. He was a graduate of Harvard College and one of the promoters in the organization of the *North American Review*. In 1819 he became professor of rhetoric at Harvard College, a position he retained until 1851.

CHANNING, Walter, physician, brother of the Rev. William Ellery Channing (q.v., Vol. V, pp. 393–395); born in Newport, Rhode Island, April 15, 1786; died in Boston, Massachusetts, July 27, 1876. He studied at Harvard, but on account of a "rebellion" in 1807 did not graduate. He pursued the study of medicine in Boston, Philadelphia, Edinburgh and London. In 1812 he began to practice in Boston, and from 1815 to 1854 occupied the chair of obstetrics and medical jurisprudence at Harvard. For nearly 20 years he was physician in the Massachusetts General Hospital. He published poems, books of travel and medical works, among them *Reformation of Medical Science; Professional Reminiscences of Foreign Travel;* and *Miscellaneous Poems*.

CHANNING, William Ellery, Jr., author; a son of Dr. Walter Channing, and nephew of the Rev. William Ellery Channing; born in Boston, Massachusetts, June 10, 1818, and studied at Harvard, but did not graduate; lived in a log hut in Illinois, removed to Cincinnati, where he was connected with the *Gazette*, then came to Massachusetts, married Margaret Fuller's sister, and settled in Concord. He was on the staff of the New York *Tribune* and the New Bedford *Mercury;* and has published *Near Home; Eliot; A Poem; The Wanderer*—all in verse; and in prose, *Thoreau, the Poet-Naturalist*.

CHANNING, William Henry, Unitarian clergyman and orator, son of Francis Dana Channing, and nephew of the Rev. William Ellery Channing; born in Boston, May 25, 1810; died in London, Dec. 23, 1884. He was graduated at Harvard in 1829, and at the Divinity School four years later. He held pastorates in Cincinnati, Boston, Rochester and New York. As a platform speaker it is said he has never been surpassed. He was interested in Fourierism and other schemes for social reorganization. He wrote a

memoir of his uncle, and was chief editor of the memoirs of Margaret Fuller Ossoli. The last years of his life were spent in England, and his eldest daughter is the wife of the poet Edwin Arnold.

CHANT. See PLAIN SONG, Vol. XIX, pp. 168–170.

CHANTILLY, a post hamlet of Fairfax County, Virginia, about 20 miles W. of Washington, District of Columbia. It is famous on account of a battle, the final encounter in the second battle of Bull Run. In this action Generals Stevens and Phil Kearny were killed. See BULL RUN, in these Supplements.

CHANTRY. See ARCHITECTURE, Vol. II, p. 462.

CHANUTE, a city of Neosho County, southeastern Kansas, on the Atchison, Topeka and Santa Fè and the Missouri, Kansas and Texas railroads, 14 miles N.W. of Erie. It is the center of the southern Kansas division of the former railroad. Industry, principally handling agricultural products. Population 1895, 3,551.

CHANUTE, OCTAVE, civil engineer; born Feb. 18, 1832, in Paris, France. He moved to the United States in 1832, and after a time spent in school in New York, began his engineering work. He was first employed by the Hudson River railroad and afterward by the Chicago and Alton and Erie railroads. His principal single work was the construction of a bridge across the Missouri River, in 1868, at Kansas City. He has written numerous papers on engineering topics, among which are *The Elements of Cost of Railroad Freight Traffic; The Preservation of Timber;* and *Progress in Aërial Navigation.*

CHANZY, ANTOINE EUGÈNE ALFRED, French general; born at Nouart, Ardennes, March 18, 1823; died at Châlons, Feb. 5, 1883. He entered the artillery as a private, received a commission in the Zouaves in 1841, and served almost uninterruptedly in Africa till 1870. He was elected to the National Assembly, and narrowly escaped being shot by the Communists in 1871. In 1873–79 he was governor-general of Algeria. Chosen a life senator in 1875, he was put forward for the Presidency in 1879. He was ambassador at St. Petersburg from 1879 to 1881, and afterward commanded the Sixth Army Corps at Châlons.

CHAPALA, the largest lake in Mexico, lies in the state of Jalisco, in the western central part of the republic, and has an area of about 1,300 square miles. It is an expansion of the Rio Grande de Santiago, and contains numerous islands.

CHAP-BOOKS, tracts of a homely kind, which at one time formed the only popular literature of Great Britain and the American colonies. They were of a miscellaneous kind, including theological tracts, lives of heroes, martyrs, wonderful personages, fortune-telling, interpretations of dreams, stories of ghosts, witches, histories in verse, songs, ballads, etc. They were sold by chapmen, or peddlers—hence the designation.

CHAPEL. See ARCHITECTURE, Vol. II, p. 462.

CHAPEL HILL, a town of Orange County, central northern North Carolina, on a branch of the Southern railroad, 26 miles N.W. of Raleigh. The University of North Carolina is located here. Population 1890, 1,017.

CHAPIN, AARON LUCIUS, an American educator and clergyman; born Feb. 4, 1817, in Hartford, Connecticut; died July 22, 1892, in Beloit, Wisconsin. He was graduated at Yale in 1837 and at Union Theological Seminary in 1842. He was a professor in the New York Institute for the Deaf and Dumb in 1838; in 1844 pastor of a Presbyterian church in Milwaukee, Wisconsin; from 1850 to 1866 president of Beloit College, and from 1866 professor of civil polity. He held many offices of honor in various societies and academies.

CHAPIN, EDWIN HUBBELL, an American Universalist clergyman; born in Union Village, Washington County, New York, Dec. 29, 1814; died in New York City, Dec. 27, 1880. He graduated at Bennington Seminary, Vermont, studied law in Troy, New York, edited *The Magazine and Advocate* in Utica, and studied for the ministry, being ordained in 1837. He preached afterward at Richmond, Virginia, for three years; at Charlestown, Massachusetts, for six years; at Boston, where he was the colleague of Hosea Ballou; and in 1848 became pastor of the Fourth Universalist Church of New York City. Dr. Chapin was considered a powerful orator, and his services on public occasions were in great demand. In 1850 he was a delegate to the peace congress at Frankfort-on-the-Main. In 1872 he became editor of the *Christian Leader.* Among his publications are *Hours of Communion; Moral Aspects of City Life; True Manliness; Humanity in the City;* and *A Crown of Thorns: A Token for the Suffering.* The last mentioned was the most popular of his works.

CHAPLAIN, originally an ecclesiastic who accompanied an army and carried the relics of the patron saint. The word now signifies the spiritual adviser of any organization or person. Legislative bodies, military and naval organizations, public institutions in general, and noblemen and sovereigns have such an officer. In the United States most prisons have chaplains to look after the comfort and needs of the inmates. In the United States army the chaplain generally holds the rank of captain, and in the navy ranks from lieutenant up to captain, according to the number of years of his service. For the British army chaplain, see ARMY, Vol. II, p. 584.

CHAPLEAU, SIR JOSEPH ADOLPHE, Canadian statesman; born in Ste. Therèse-de-Blainville, Terrebonne Co., Quebec, Nov. 9, 1840. He was admitted to the bar of Lower Canada in 1861, and soon made a brilliant reputation in the criminal courts. In 1867 he represented his county in the first legislature of the province of Quebec. He became queen's counsel in 1873, held the office of solicitor-general in Mr. Ouimet's cabinet, and two years later (1875) was champion speaker of the Conservatives, winning such success that he was called into the De Boucherville ministry as

provincial secretary and registrar. In 1878 Mr. Chapleau was elected leader of the party, and the following year became premier of Quebec and minister of agriculture and public works. He was invited to enter the Dominion cabinet, but for political reasons did not do so until the invitation was renewed in 1882, when he became Secretary of State. The following month, August, he was elected to the House of Commons by his county; in June, 1891, again became Secretary of State of the Dominion; and in Jan., 1892, Minister of Public Works. In Dec., 1892, he became lieutenant-governor of the province of Quebec. Died in Montreal, June 13, 1898.

CHAPLET, a garland or head-band of leaves and flowers. See also ROSARY, Vol. XX, p. 848.

CHAPLIN, CHARLES JOSHUA, portrait-painter; born in Les Andelys, France, June 6, 1825; died in Paris, Jan. 30, 1891. His father was English, his mother French. He studied at the École des Beaux-Arts and under Drölling; became a chevalier of the Legion of Honor in 1877. His works include *Soap Bubbles; A Bather; Girls Kneeling at a Shrine* (in the Walters Gallery, Baltimore); and *Haidée*, in the Museum of Art, New York.

CHAPLIN, HENRY, an English statesman, the farmers' member of the British Parliament, was born in 1841 and educated at Harrow School and Christ Church, Oxford University. From November, 1868, to November, 1885, he represented Mid-Lincolnshire in the House of Commons, since which date he sat for the northern division of the Parts of Kesteven or Sleaford, in the same county. The tenant farmer of England was always the object of his legislative solicitude. He was prominent in the councils of the Conservative party, a frequent and incisive debater and an authority on all matters agricultural. His politics were of the old Tory stripe and his adherence to his party procured him several important offices. In June, 1885, he was appointed Chancellor of the Duchy of Lancaster, and in 1889, on the formation of the Board of Agriculture, Mr. Chaplin was appointed its first president, with a seat in the Cabinet. In 1885 he was sworn of the Privy Council. In 1876 Mr. Chaplin married Lady Florence Leveson-Gower, daughter of the third Duke of Sutherland. She died in 1881.

CHAPLIN, WINFIELD SCOTT, an American civil engineer and educator; born in Glenburn, Maine, Aug. 22, 1847; was graduated at West Point in 1870; spent two years in the army, and devoted two years to civil-engineering. In 1874 he was appointed professor of mechanics at Maine State College; in 1877 in the Imperial University of Tokyo, Japan, as professor of civil engineering; first in Union College, New York, and then in Harvard College as professor of civil-engineering. In 1891 he became chancellor of Washington University, St. Louis, Missouri.

CHAPMAN, ALVAN WENTWORTH, an American botanist; born Sept. 28, 1809, in Southampton, Massachusetts; was graduated at Amherst in 1830; practiced medicine until 1846. He was collector of revenue for Florida in 1865–66, and of customs from 1866 to 1869. During the greater part of his life he has paid attention to the study of botany. The genus *Chapmannia* is named for him. He has published *Flora of the Southern United States.*

CHAPMAN, ELIZABETH RACHEL, MISS, a British novelist and poetess, was born in Woodford, Essex. Her writings treat chiefly of those social movements that have for their object the improvement of the condition of woman. Her published works include *The New Godiva; A Comtist Lover; A Little Child's Wreath:* and *A Sonnet Sequence.*

CHAPMAN, JOHN GADSBY, an American painter; born in 1808 at Alexandria, Virginia; studied in Italy; a founder of the Century Club, New York; went to Italy again in 1848, and resided in Rome until his death, Nov. 28, 1889. The work by which he is best known is *The Baptism of Pocahontas*, now in the rotunda of the Capitol at Washington. Others of his paintings are *Sunset on the Campagna; Last Arrow;* and *Valley of Mexico.* His etchings are highly valued. Among them are *The Gleaner; A View in the Vicinity of Rome;* and *A Monk Asking Alms.*

CHAPPAQUA, a small village of Westchester County, southeastern New York, on the Harlem railroad, where Horace Greeley had his summer home. Here is a good boarding-school under the control of the Society of Friends. Population, 733.

CHAPPELL, WILLIAM, an English music publisher, was born Nov. 20, 1809; died in London, Aug. 20, 1888. His first work of importance was *A Collection of National English Airs* (2 vols., 1838–40). This work ultimately grew into the greater and entirely rewritten work, *Popular Music of the Olden Time* (2 vols., 1855–59). The first volume forms a complete collection of English airs, so far as known, down to the reign of Charles I; the second is rather a selection, containing, however, all the more interesting or important airs of later date. He took a principal part in the foundation, in 1840, of the Musical Antiquarian Society, and the Percy Society, and edited some of Dowland's songs for the former, and several rare collections for the latter. He published papers in the *Archæologia*, contributed valuable notes to a reprint of the *Percy Folio MS.* (1867–68), and annotated the first three volumes of the Ballad Society edition of *The Roxburghe Ballads.* He published, in 1874, the first volume of a *History of Music.* See MUSIC, Vol. XVII, p. 77, note.

CHAPRA, a town of Bengal. See CHUPRAH, Vol. V, p. 758.

CHAPTER. See CATHEDRAL, Vol. V, p. 228; and CONGE D'ELIRE, Vol. VI, p. 265.

CHAPTER-HOUSE. See ARCHITECTURE, Vol. II, p. 462.

CHAPULTEPEC, a rock two miles S.W. of the City of Mexico, rising to a height of 150 feet, and crowned by a castle which was erected by the Spanish viceroy in 1785, on the site of the palace of Montezuma. Here was fought the decisive battle of the Mexican War. This rock and castle formed a stronghold, the possession of which was

essential to the capture of the City of Mexico. General Scott decided to carry it by direct assault. He engaged the attention of the Mexicans at the south end of the city by a heavy fire from the batteries. This fire was kept up for two days, and on the third (Sept. 13, 1847), under the cover of the guns, two storming columns of picked men assaulted the castle and captured it. The American loss in killed and wounded during the two days' battle was less than 900. The fall of Chapultepec obliged the Mexicans to give up the war. The President of the republic now occupies the castle as a summer residence, while adjoining it is the West Point of Mexico, the Mexican Military School.

CHARACEÆ, a group of green Algæ of complex structure. They grow in dense masses at the bottom of fresh and brackish water, and being often incrusted with lime, and hence rough and brittle, are sometimes called "brittle-worts" or "stone-worts." The plants are from a few inches to more than a foot long, the stem having long internodes (each internode in *Nitella* being one cylindrical cell, in *Chara* being a similar cell surrounded by a layer of smaller ones), the leaves and branches appearing in whorls at the nodes, and the conspicuous sex-organs (antheridia and oögonia) borne on the leaves. The circulating movement of protoplasm is easily seen in the internodal cells.

CHARADRIIDÆ, a family of birds comprising the plovers and similar forms. The representatives of the family are cosmopolitan in distribution. See CURLEW, Vol. VI, p. 711.

CHARAES OR XARAYES, a district of inundations. See BRAZIL, Vol. IV, p. 222.

CHARCOT, JEAN MARTIN, French physician; born in Paris, Nov. 25, 1825; died in the Morvan, central France, Aug. 18, 1893. He obtained his diploma as M.D. in 1853; was called to a place on the staff of the Salpétrière in 1862, from which time he continually devoted his attention to the study of the nervous system, and came into international prominence through his experiments in hypnotism and mental suggestion. Besides his principal works on various forms of disease, his *Leçons Cliniques sur les Maladies du Système Nerveux*, and his *Leçons du Mardi à la Salpétrière*, he founded, in 1880, and edited the *Archives de Neurologie*, and took a leading part in the direction of the *Revue de Médecine*, *Archives de Pathologie Expérimentale*, and the *Nouvelle Iconographie de la Salpétrière*. He was a member of the Institute of France, of the Royal Irish Academy, of the Royal Medical and Chirurgical Society of London, and of a great number of other scientific societies in various countries.

CHARD AND CARDOON, vegetables. See HORTICULTURE, Vol. XII, pp. 278, 280.

CHARD, JOHN ROUSE MERRIOTT, an English soldier, famous for his heroic defense, with Lieutenant Bromhead, of the post of Rorke's Drift, in the Zulu war; was born in the county of Somerset, England, Dec. 21, 1847. He was educated at Plymouth and Woolwich, and was gazetted a lieutenant in the Royal Engineers, July 15, 1868. After service at home, in Bermuda and Malta, he was ordered to Zululand on the outbreak of the Zulu war. Here, on the disaster of Isandula, Jan. 22, 1879, he held the near-by commissariat post at Rorke's Drift with eighty men, against an *impi* of 3,000 of the flower of the Zulu military system. Six times the little band of English soldiers drove the savages out of the barricade around the hospital at the point of the bayonet, killing 351 and wounding over 1,000. The heroic defense saved the towns of Helpmakaar and Grey Town from the horrors of a Zulu raid, and its incidents formed the subject for noted pictures by De Neuville and Lady Butler. Lieutenants Chard and Bromhead were decorated with the Victoria Cross for their valor. The former was made captain in 1879, major in 1886, and lieutenant-colonel in 1893. He died at Taunton, Eng., Nov. 1, 1897.

CHARDON, a village and the capital of Geauga County, northeastern Ohio, 37 miles N.N.E. of Akron, on the Pittsburg and Western railroad. It has considerable trade in dairy and farm products. Population 1890, 1,084.

CHARES, an Athenian general. See TIMOTHEUS, Vol. XXIII, p. 398.

CHARES OF RHODES, sculptor. See COLOSSUS, Vol. VI, p. 166.

CHARGE. See HERALDRY, Vol. XI, pp. 698, 704.

CHARGÉ D'AFFAIRES, a diplomatic agent, accredited, not to the sovereign, but to the department for foreign affairs; he also holds his credentials only from the minister. The term is also applied to a representative at an inferior court.

CHARITABLE USES. See TRUST, Vol. XXIII, pp. 597, 598.

CHARITES, Greek myths. See GRACES, Vol. XI, p. 26.

CHARITON, a river which rises in Clarke County, central southern Iowa, flows east, past the city of Chariton, then southeast, enters Missouri, and with many windings finds its way southward to the Missouri River, two miles above Glasgow. The country through which it passes is fertile and undulating. Its length is about 250 miles.

CHARITON, capital of Lucas County, central southern Iowa on the Chariton River, and on the Chicago, Burlington and Quincy railroad, 50 miles S. of Des Moines. It is in an agricultural district. Population 1890, 3,122.

*CHARITY ORGANIZATION, a term that has come into general use to denote a recent movement for bringing the relief agencies of large communities into administrative co-operation. Particular associations bear different names, as associated charities, united charities, bureau of charities, etc.; but the phrase *charity organization* is a popular abbreviation of the title of the parent society in London. This association was instituted in 1869 under the cumbrous style of the "London Society for Organizing Charitable Relief and Repressing Mendicity." It is a general characteristic of this movement that it

*Copyright, 1897, by The Werner Company.

did not proceed from various relief societies uniting to form boards or councils of their own delegates, but from an independent movement to provide a distinct agency to which these societies might adhere voluntarily, and through which they might act in concert. Hence arises a distinct character for those associations that adopt pure charity organization principles. They do not aim to create funds for distribution amongst the necessitous, but rather to promote an economic and salutary distribution of the funds provided by the entire benevolence of a community for the relief of want. In some instances charity organization societies have taken up the work of dispensing funds directly to applicants for aid. In this case, the proceeding has grown out of the neglect or failure of relief societies to co-operate; but it is a deviation from the original scheme and basal principles of charity organization.

For two generations before the London society was established, thoughtful men had come to deplore the mischiefs wrought by an indiscriminate almsgiving. They discovered that alms created the very conditions they were supposed to cure; that benefits to be obtained for nothing produced a crop of applicants greedy to obtain an unearned share of the provision made for the poor. As Chalmers stated the problem, to those who were in want the accumulation of the many gifts of the benevolent into a few treasuries intended for their succor seemed a munificent provision. The poor did not consider the numbers among whom the money was to be divided, but only the total, and this seemed to them inexhaustible. These sums were disbursed, not by the donors, but by officials who became professional in their dealings with the multitude, and who were only almoners of others to whom the beneficiaries of these funds owed neither gratitude nor respect. To the poor, each such almoner was a Cerberus guarding the gates of plenty. Under such an administration, the destitute, who were too often so rather from defects of character than from real misfortune, acquired arts of beggary with dissimulation, and that is the spirit of pauperism. They became shameless, mendacious, brazen. Not only this, but they told others of the relief to be had, and of the arts by which it was to be obtained. No system could well be devised for corrupting the weak and penniless, and for extending pauperism. It was immaterial whether the funds to be given away were raised by taxes and dispensed by the parish, or were consolidated into the foundations of hospitals and asylums, or were dispensed by voluntary societies, or came from the free hand of personal generosity. The material defects of the whole scheme were these: Gifts of money were treated by the community as a panacea for all the ills of poverty, whereas what the poor sorely needed was the help of brave, spirited, well-disposed and potent friendship; in other words, society substituted cash for sympathy, a stone for bread; again, the temptation of ample treasuries to be tapped by begging was spread in the face of misfortune, teaching them to rely upon artificial and irregular means of support, rather than upon the employment of their own faculties as a means of subsistence. Investigation showed that children abandoned aged parents, and husbands wives, and parents children, in proportion as hospitals and asylums were founded; that applications for relief grew as the tax rate increased; that want was always exceeding the provision made for it by the benevolent.

The humanity of men forbade the suppression of pecuniary relief, but it was clearly desirable that such relief should be administered in the most prudent and efficacious way, so that misfortune might be succored with the least corruption of the poor. The problem had been attacked many times and in many places with success. Chalmers had solved it in Glasgow, and Von der Heydt at Elberfeld, in Prussia. The operations of the Society of St. Vincent de Paul and the work of Octavia Hill in East London had shown that much could be done for the necessitous by other means than alms. Experience also had been gained in the especial relief of the Lancashire mill-operatives during the cotton famine in England caused by the American Civil War. An undoubted impulse to the organization of the London society was found in the mission of Edward Dennison to Stepney, East London, in 1868, where he resided eight months, visiting and studying the conditions of wretchedness there. He wrote: "I am beginning seriously to believe that all bodily aid to the poor is a mistake; whereas, by giving alms you keep them permanently crooked. Build schoolhouses, pay teachers, give prizes, frame workman's clubs, help them to help themselves, lend them your brains; but give them no money except what you sink in such undertakings." His high personal and social standing influenced his friends, and they joined together in 1869 to form the society named.

It was impossible to bring the vast number of various organizations of the metropolis, parish relief, asylums, workhouses, voluntary societies, to organize themselves into a unity. In many cases they did not see the need of better methods; in others they were unwilling to have their administration criticised; altogether they were too multitudinous, unwieldy and inert to construct for themselves measures of practical co-operation. To draw them into unity the London society proposed a bureau where each of these independent agencies might register every case of its own relief, where their thousands of reports could be consolidated, and whence each might learn the result of these collated records. By such a registration bureau the whole field of London misery might be disclosed and the various societies made auxiliary to each other. The London society further proposed to send out friendly visitors, who should not give relief, but should befriend with their brains and counsels those who applied for aid, and whose reports upon each case should be available to all sorts of relief officials and

private benefactors for the direction of their almsgiving.

The society organized district committees, one for each poor-law union in London. These committees consisted of clergymen, guardians of the poor and representatives of local charities. The district committees by delegates constituted a council, of which there were some few *ex officio* members. The functions of the council were to give unity of principle and method to the district committees; to aid them in every way, as by suggestion, by repression of imposture, through the agency of the law when necessary, and by seeking systematic co-operation from London's municipal and voluntary agencies of relief. The district committees were to aim at the prevention of overlapping aid, were to investigate all cases of need made known to them; were to obtain, if possible, from existing provisions, suitable and adequate succor for the deserving; were to place their knowledge of particular needs at the service of charitable agencies and private persons; were to promote social and sanitary reforms and habits of thrift; and were to advise the public concerning matters they thought desirable to accomplish, and for which suitable provision was not made. In substance, this plan has been followed wherever charity organization principles have been adopted in the United States.

The first movement of this nature known in the United States is to be credited to Boston, where the city, in combination with private citizens, erected an edifice, known as the Charity Building, in Chardon Street, to be the official home of municipal and private relief organizations. Here a certain amount of co-operation was obtained, and the way prepared for the fuller development of a wise and efficient system. This building was erected in 1869 and was contemporary with the formation of the London society. The first conscious adoption of the methods of the English society took place in Germantown, a suburb of Philadelphia, in 1873. This was a rural suburb and a distinct ward, characterized by considerable unanimity of social sentiment and local pride, having wealth and intelligence as well as poverty. The success of the Germantown association attracted attention, and began to be widely quoted throughout the city and elsewhere. In 1878 an English clergyman, who had been an active official of the London society, came to Buffalo and established a charity organization society there, which, from the outset, obtained the co-operation of the executive government. Results were immediately seen in the improved administration of the civic charities, and the movement was warmly supported by a body of intelligent and patriotic citizens. In the same year, a new movement in Philadelphia, in which Germantown was merged, resulted in the establishment of a large and highly successful society there, with branches spread throughout the wards of the city. From these points the organizations spread year by year to the principal cities of the Union, until in 1895 there were 132 such associations, extending from Ottawa to New Orleans and from Maine to California. Some of them were old relief societies that adopted charity organization principles and came into accord with the general movement; the most of them were new foundations, offering their services to the communities in which they were located. These communities embrace a population of nearly fourteen million souls.

Charity organization societies are in correspondence with each other, as well in America as throughout the British Empire. By this means they are able to follow a case from Australia to Puget Sound, sometimes returning a destitute person to family friends, sometimes recovering a pension, and sometimes putting a stop to depredations upon benevolent society throughout the English-speaking world.

In theory, a charity organization society proposes to do everything requisite for the permanent relief of destitution and the reformation of character that ingenuity can devise, and to find the means therefor, if possible, in the provisions for succor that each community has already founded. It aims to establish everywhere a corps of visitors who shall attach themselves to families and to individuals, with a view to acquiring a complete understanding of the nature of their wants and of suitable proceedings to restore them to independence. This visitation work is largely, and most appropriately, the function of women. Where mendicity is encountered, it is resisted. Efforts are made to suppress corrupting relief by invoking labor-tests, such as woodyards and wayfarers' lodges. Labor-tests consist in the requirement of a certain amount of coarse but simple work in return for food and lodging. Those who endure the test are retained long enough for them to find employment; those who refuse it are treated as vagrants.

Various devices have been found, such as savings funds, small loans for the purchase of tools, workrooms for unskilled women, laundries, crèches for the care of children, while the mothers are at work, employment bureaus, etc., to place needy persons in conditions of temporary self-maintenance, etc., until a better way of self-support may be found. Provision is also made to secure suitable sanitary conditions in tenements, and to afford children and young mothers outdoor excursions, or a short sojourn in country homes.

It is also a principle of charity organizations to bring into concert of administration to the utmost extent, not only the large charitable and penal institutions of municipal departments of charity and correction, but churches, voluntary societies and beneficent individuals. Such co-operation is hard to obtain, on account of the vast extent of the field and the sluggishness arising from the established traditions and persistent habits of a community. Considering the inertia to be overcome, this branch of work has made reasonable progress, and the ground once covered is seldom wrested away.

Recently a new phase of the work has sprung up,

full of promise, both for the working out of charity organization doctrines as a part of sociological science, and in disseminating higher intelligence in the work. It consists of an alliance made between universities and the larger of these societies, as in Boston, New York and Chicago, where the universities of Harvard, Columbia and Chicago, have established seminaries to which the organization societies are auxiliaries. The young students enter the service of these societies under the direction of their preceptors, to study the operations of economic laws in the pauper world. The effect is reciprocal, for the societies profit by the intelligent study and criticism of their university associates, while these associates test their judgments in the wide field of practice.

Charity organization forms a section of the National Conferences of Charities and Correction which meets yearly at some previously designated city, and here goes on a valuable exchange of views, founded upon actual records of work done and the disclosure of methods employed in various parts of the country.

The influence of this movement has been very wide—perhaps wider and more potent in its influence on the legislation of many states, on the administration of municipal charities, and in stimulating new enterprises, such as university settlements, kindergartens, trade schools, etc., than in the results of direct contact with the destitute. Still, these latter results are by no means small, and have introduced a new criterion of humane succor. It is more and more widely seen that the type of true benevolence is not in the magnitude of things given away, but in the recovery of souls from personal depression and degradation.

Charity organization is simply a distinct recognition of the facts that real misfortune, as a rule, is but temporary; that a sound society rests more upon character than circumstances; and that the only effectual method of eradicating social evils is moral—that is, that the strong and the healthful and the wise shall make their poorer brethren participators in these qualities.

Literature. The proceedings of the National Conference of Charities and Correction, published annually, contain an account of the Charity Organization Section sessions and the papers read there. The leading periodicals devoted to this work are monthlies, and, in the order of their founding, are *The Monthly Register* (Philadelphia) *Lend a Hand* (Boston) and *The Charities Review* (New York). The larger societies keep on hand a list of small treatises of practical character concerning various phases of charity organization, and their reports contain much general information. The two most compact histories of the movement in America are by S. H. Gurteen and Charles D. Kellogg.

D. O. KELLOGG.

CHARITY, SISTERS OF, one of the sisterhoods of the Roman Catholic Church. The members of this order are sometimes called "Gray Sisters," "Daughters of Charity" and "Sisters of St. Vincent de Paul." The order or congregation was founded by St. Vincent de Paul at Paris in 1634. Its first object was to be the nursing of patients in hospitals. There have since been added to the duties of the members, the taking charge of orphanages, and in some places the management of poor-schools. They are under the direction of the Lazarists. Their vows are simple and are renewed each year. The order, at first confined to France, is now spread all over the world, and numbers between 30,000 and 40,000. There are also, in addition to the order just described, the Sisters of Charity in Ireland and the Sisters of Charity of St. Paul. The former was founded in Dublin, Ireland, in 1815, by Mary Frances Aikenhead. The order is similar in its objects to the main society. The vows, however, are perpetual. In 1891 this order had 22 convents in Ireland and one in England. The central power is in the mother superior, who has jurisdiction over the whole. The Sisters of Charity of St. Paul was founded by Chauvet, a French curé, in 1704. This order is devoted almost entirely to giving instruction to the children of the poor. It was introduced into England in 1847.

CHARIVARI, a serenade of discordant music, used originally to annoy widows who married the second time, but also, on other occasions, when the performers desired to annoy or insult any one. In some districts of the United States, this rough kind of serenade is common at any marriage, and is generally rather a token of good feeling than of any desire to insult either bride or groom. As synonomous with ridicule, the name has been taken for several comic journals, the Paris *Charivari*, etc. See CARICATURE, Vol. V, p. 105.

CHARLES I (CHARLES EITEL FREDERICK ZEPHYRIN LOUIS), king of Roumania, was born April 20, 1839, being the second son of Prince Charles Antoine of Hohenzollern-Sigmaringen, head of the house of the same name. He became Prince of Roumania in April, 1866, and in 1881 king. He married Pauline Elizabeth Ottilie Louise, daughter of Prince Hermann of Wied, in 1869, who has achieved considerable reputation as the authoress of several novels and some verse under the *nom de plume* of "Carmen Sylva." See ELIZABETH OF ROUMANIA, in these Supplements.

CHARLES I.

CHARLES I, an eccentric king of Würtemberg; born March 6, 1823; succeeded his father, William I, on June 25, 1864. He married, July 13, 1846, the Grand Duchess Olga, daughter of Nicholas I, czar of Russia. Originally an opponent of the unification of Germany, at any rate to the extent of Prussian pre-eminence, he conceded to the inevitable, and supported his fellow-Germans with an army corps in the sharp and decisive struggle with France in 1870. Though trained to militarism, his bent was toward art and literature. Stuttgart benefited architecturally, musically and scientifically by his reign, the last ten years of which were rendered ludicrous by

Charles I's credulous encouragement of a parcel of American adventurers, who evolved weird hypnotic experiences wherewith to control the weak-minded king. His last years were practically passed in confinement. He died in Stuttgart, Oct. 6, 1891, and was succeeded by his uncle's grandson as William II.

CHARLES III, PRINCE OF MONACO, born in 1818; he succeeded his father, Florestan I, on June 20, 1856. Early in his reign he sold the communes of Mentone and Rockabrunna to France for the sum of $800,000 to replenish the empty coffers of his petty principality. While with one hand he built a Benedictine monastery, so as to secure a bishopric at Monaco for his spiritual needs, with the other he fostered the principal gambling-den of Europe, which, after his abolition of all taxes, was his only source of revenue. With the co-operation of the pope in 1880, he divorced his son and heir from his wife, Lady Mary Douglas Hamilton, after a union of 11 years. He died Sept. 10, 1889, and was succeeded by his son, Albert Honoré Charles.

CHARLES, CAPE, the most southern point of Northampton County, eastern Virginia, at the entrance of Chesapeake Bay. On Smith's Island, a little N.E. of the cape, is a lighthouse with a flashing light, in lat. 37° 7′ N., long. 75° 53′ W.

CHARLES, ELIZABETH (RUNDLE), an English writer of religious stories; the only child of Thomas Rundle, at one time member of Parliament for Tavistock, Devonshire; born in 1826, she married Andrew Paton Charles of London in 1851. In 1863 she published *The Chronicles of the Schönberg-Cotta Family*, a story of the days of Luther, and with a distinctively religious purpose. This work had considerable popularity, especially in America. It was followed by *The Diary of Mrs. Kitty Trevelyan* (1864), a novel dealing with the Wesleyan movement; *The Early Dawn* (1864); *Winifred Bertram, and the World She Lived in* (1866); *The Draytons and the Davenants* (1867); *The Martyrs of Spain and Liberators of Holland* (1870); *Against the Stream* (1873); *Joan, the Maid* (1879); *Lapsed, not Lost* (1881). She edited some works of Christian song, in addition to her other labors. She died in Hampstead, London, England, March 29, 1896.

CHARLES, JACQUES ALEXANDER CÉSAR (1746–1823), a French physicist. See AERONAUTICS, Vol. I, p. 188.

CHARLES CITY, a railroad junction, and the capital of Floyd County, northeastern Iowa, on the Cedar River. It has various manufactories, among which is one for furniture. It has the best water-power in the northern part of the state. Population 1895, 4,201.

CHARLES FREDERICK AUGUST WILLIAM, DUKE OF BRUNSWICK, born Oct. 30, 1804; the son of the Duke of Brunswick who fell at the battle of Quatre Bras. He succeeded to the dukedom in 1823, and was deposed by the German Diet for his arbitrary conduct. He resided for many years in Paris and London, and died August, 1873, leaving a vast fortune to the city of Geneva.

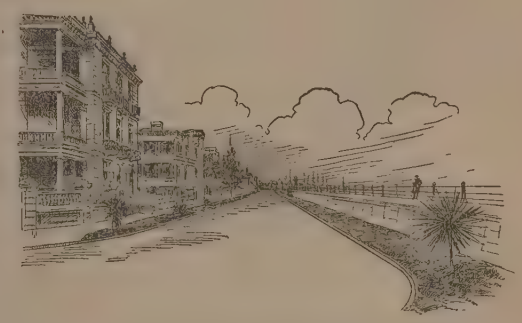
CHARLES RIVER rises in eastern Worcester County, central Massachusetts, flows southeast to Bellingham Junction, turns northeast, meets the tide-water at Cambridge and forms part of Boston harbor. It is about 75 miles in length.

CHARLES'S WAIN, the constellation Ursa Major, the Great Bear; also popularly known as the Plow and the Dipper. The term is a corruption of the old English *ceorles wæn* (the churl's wagon), and has been further corrupted into "King Charles's wain." Shakespeare refers to it in *Henry IV.*

CHARLESTON, a city and capital of Coles County, central eastern Illinois, on the Cleveland, Cincinnati, Chicago and St. Louis and on the Toledo, St. Louis and Kansas City railroads, 48 miles W. of Terre Haute. It has an infirmary and a medical college. Population 1890, 4,135.

CHARLESTON, a town and the capital of Mississippi County, southeastern Missouri, on the St. Louis, Iron Mountain and Southern railroad, 12 miles S.W. of Cairo. It has an academy. The district is agricultural, and also produces a large amount of lumber. Population 1890, 3,181.

CHARLESTON, a city of South Carolina, and county seat of Charleston County. The trade of the city for the year 1889 amounted to $80,000,000, an increase of $4,000,000 over that of the



THE BATTERY, CHARLESTON.

previous year. The imports for 1889 were $683,232, and exports $13,807,673. Manufacturing industries numbered 360, with $9,000,000 capital, producing $13,742,879. The phosphate industry leads, the trade in phosphate fertilizers alone amounting to $5,494,650, as against $2,612,660 in 1887. The supply of water is obtained from three artesian wells, the third and largest of which was completed in 1889. The daily supply is 2,000,000 gallons. Public schools and libraries have advanced with the population and wealth of the city, and a new post-office and custom-house have been added to the public buildings. Population 1880, 49,984; 1890, 54,955. See also CHARLESTON, Vol. V, pp. 428, 429.

CHARLESTON OR KANAWHA COURT-HOUSE, the capital of West Virginia, and the capital of Kanawha County, in the central western part of the state, situated on the Elk and Kanawha rivers. A large amount of manufacturing and shipping is done in this city. Ice, furniture,

doors, blinds, wagons and iron fences are made; there are dry-docks and ship-building yards, many fine public buildings, water, gas and electric-light works. The city is the commercial center of an extensive coal region. In 1869 this city was the state capital; in 1875 Wheeling became the capital; in 1885 Charleston was again made the capital. Population 1890, 6,742.

CHARLESTON, College of, founded in October, 1775, at Charleston, South Carolina, as the definite form of a resolution passed by the citizens of that town in June, 1770. The first commencement exercises were held in October, 1794, and in 1830 new and spacious buildings were added. Though almost totally destroyed by the great earthquake in August, 1886, the college has kept steadily advancing. To-day it possesses $256,700 invested funds, producing an annual income of $10,712. Six instructors, under the presidency of H. E. Shepherd, LL.D., impart a non-sectarian education to male students.

CHARLESTOWN, a manufacturing town of Sullivan County, central western New Hampshire, on the Connecticut River, and on the Central Vermont and Boston and Maine railroads, 50 miles W. of Concord. It has manufactories of boots, shoes and lumber. Population 1890, 1,466.

CHARLESTOWN, a railroad town and the capital of Jefferson County, eastern West Virginia, on the Baltimore and Ohio and the Norfolk and Western railroads, nine miles W. of Harper's Ferry. John Brown was tried and executed at Charlestown, Dec. 2, 1859. Population 1890, 2,287.

CHARLEVOIX, village and the capital of the county of same name, southwest of the Little Traverse Bay, Michigan, on the Chicago and West Michigan railroad, 14 miles W.S.W. of Bay View. It is a summer resort, and has a trade in lumber and fish. Population 1895, 1,796.

CHARLOIS, a village of south Holland, situated on the Maas, about two miles S.W. of Rotterdam. It is memorable on account of a terrible accident which occurrred here in 1515. A religious procession crossing on the ice in defiance of magisterial prohibition, was precipitated into the Maas, and 8,000 lives were lost. Population 1890, 2,053.

CHARLOTTE, a railroad city and the capital of Eaton County, central southern Michigan, on the Michigan Central and the Chicago and Grand Trunk railroads, 20 miles S.W. of Lansing. Lumber and flour are here manufactured. Population 1894, 4,350.

CHARLOTTE, a city and the capital of Mecklenburg County, North Carolina, situated on Sugar Creek, and on the Southern and the Seaboard Air Line railroads, 110 miles N. of Columbia, the capital of South Carolina. The courthouse is a substantial and commodious structure. The Biddle (Presbyterian) University was organized here in 1867. In 1838 a branch mint was established in Charlotte for the coinage of gold found in the vicinity. The principal manufactories are of carriages, machinery, cotton goods, agricultural implements, tobacco and iron castings. Population 1880, 7,094; 1890, 11,577.

CHARLOTTE, ex-empress of Mexico. See Carlotta, in these Supplements.

CHARLOTTE–AMALIE, capital of St. Thomas Island, Danish West Indies, in lat. 18° 20′ N., long. 65° W. It extends for a mile along the shore, and is a station for mail steamers which ply between Southampton and the West Indies. Being a free port, its trade is extensive. Population 1887, 13,000. See also St. Thomas, Vol. XXI, p. 200.

CHARLOTTE AUGUSTA, princess of Great Britain, the only child of King George IV and Queen Caroline. She married, in 1816, Leopold of Saxe-Coburg, afterward King of the Belgians, and died Nov. 6, 1817. As to her treatment by her debauchee father, see Brougham, Vol. IV, p. 376; George IV, Vol. X, pp. 427–429.

CHARLOTTE HARBOR, an inlet of De Soto County, southwestern Florida, and the mouth of the Peace River. It is nearly 24 miles long, very shallow, not exceeding 10 feet at any point. The harbor is protected by a long chain of islands on the west side.

CHARLOTTETOWN, capital of Prince Edward Island. (See Vol. V, p. 430.) It has a good harbor and a large trade; has fine public buildings, and is the seat of Prince of Wales College, St. Dunstan's (Roman Catholic) College, and a Methodist College. Population 1891, 11,373.

CHARNOCK, Richard Stephen, a distinguished English philologist and scholar; born in London, Aug. 11, 1820; educated at King's College, London, and was admitted an attorney. He devoted his life to the study of anthropology, philology and science in general, and obtained wide and most universal recognition of his abilities,—among others, in the degree of doctor of philosophy from the University of Göttingen. His works include *Verba Nominalia* (1866); *Manorial Customs of Essex* (1870); *A Glossary of the Essex Dialect* (1879); *A Study of the Walloons* (1871); and many others.

CHARON OF LAMPSACUS, a noted historian of Lampsacus, who flourished about 464 B.C., and wrote works on Ethiopia, Persia, Greece and other countries, the fragments of which were collected and published by Max Müller in 1841.

CHARR, a fish of the *Salvelinus* genus. See Salmonidæ, Vol. XXI, pp. 223, 225.

CHART, a marine or hydrographical map exhibiting a portion of a sea or other water, with the islands, coast of contiguous land, surroundings, currents, etc. See *Nautical Maps*, under Map, Vol. XV, pp. 518–520; especially Surveying, Vol. XXII, pp. 709–711, 714–717.

CHARTA EMPLASTICA, an adhesive medicated paper, used for the purpose of raising blisters on the human body. As a rule, these are prepared by smearing one side of a sheet of smooth, soft paper with a mixture of wax, oil, spermaceti, resin, Canada balsam and powdered cantharides.

CHARTE, a charter or system of constitutional

law embodied in a single document. The first such charter in France is known as the *Grande Charte*, or the charter of King John (1355). But the constitution to which the term *charte* is most frequently applied is that in which Louis XVIII solemnly acknowledged the rights of the nation on his restoration in 1814. This charte has ever since been considered the fundamental law of constitutional monarchy, when that form of government has existed in France. There is also the charte of 1830, which was sworn to by Louis Philippe. It recognizes the popular sovereignty.

CHARTER, a term applied in the United States to the deed or instrument of conveyance by which land is granted by the government to an individual or a corporation. The certificate issued by the proper officers of a state or the act passed by the legislature creating a corporation is also called a charter. See also CHARTER, Vol. V, pp. 431–433.

CHARTER HOUSE, one of the nine great public schools of England; founded by Thomas Sutton in A.D. 1611, on the site of the celebrated Carthusian monastery founded by Sir Walter Manny in A.D. 1371. (See ABBEY, Vol. I, p. 21.) Until 1872 the school was located in Charter House Square, in London, but the superior sanitation of a country site moved the trustees, in 1872, to transfer the entire institution to Godalming, in Surrey, where it occupies a handsome set of buildings in the form of a quadrangle. The school is rich in scholarships, no less than sixty being tenable by students, while twenty-one exhibitions to the universities, of the annual value of four hundred dollars, and tenable for four years, enable industrious but impecunious scholars to pursue their studies at Oxford or Cambridge. The students average five hundred in number, and are presided over by the head master, the Rev. W. Haig Brown, LL.D., with the Archbishop of Canterbury as the chairman of the board of trustees. The roll of alumni is long and one of honor. Here studied Thackeray, the humorist; Grote, the historian of Greece; Addison, the essayist; Blackstone, the jurist; Thirlwall, the divine; John Leech, the cartoonist; and scores of other Englishmen who attained fame.

CHARTERIS, ARCHIBALD HAMILTON, a Scotch theologian; born in Dumfries, Dec. 13, 1835; educated at Edinburgh University, where, after holding some pastorates, he became professor of Biblical criticism. In 1868 he organized the Christian Life and Work Committee. He was moderator of the General Assembly of the Scotch church in 1892. His works are numerous, and include *A Biography of Dr. James Robertson* (1863) and *The New Testament Scriptures* (1883).

CHARTER OAK, an oak tree with a halo of legend around it which formerly stood in Hartford, Connecticut. When Sir Edmund Andros marched to Hartford in 1687 as the emissary of King James II, and in order to demand the charter of the colony, with a view to its revocation, it is said that the charter was concealed in a hollow of this oak by Captain James Wadsworth. Venerated by all the countryside, the

CHARTER OAK.

historic tree was prostrated by a gale on Aug. 21, 1856, fortunately having been carefully drawn by an artist some few years previously.

CHARTRES, DUC DE (Robert Philippe Louis Eugène Ferdinand d'Orléans), grandson of King Louis Philippe of France; born at Paris, Nov. 9, 1840. He lost his father at the age of two years, and when six years old was driven into exile by revolution. He learned the military art in the Italian army, and served as a captain on McClellan's staff in 1862, during the early part of the American Civil War. He married, June 11, 1863, the eldest daughter of the Prince de Joinville. After Sedan he came to the aid of France, serving in General Chanzy's army corps under an assumed name. On the revocation of the edict of banishment in 1871, he served as major in Algiers, becoming lieutenant-colonel and ultimately colonel commanding the Twelfth Chasseurs. In 1883 he was dismissed from the French army by the Republican government, and in 1886 again banished from the country as a possible pretender to the throne.

CHARTULARY OR CARTULARY, a collection of charters. As soon as a body, ecclesiastical or secular, possessed a considerable number of charters, they were classified and copied into a book or roll, called a chartulary; the officer in the ancient Latin church who had charge of the records was called a cartulary. See also DIPLOMATICS, Vol. VII, p. 253.

CHARTERS TOWERS, a mining township of Davenport County, northeast Queensland, Australia, situated on the northern spurs of the Towers Mountain, 820 miles N.W. of Brisbane. It dates from the gold discovery here of 1871–72, and was incorporated in 1877. It has railway connection with Townsville, on the coast. Population 1890, 4,597.

CHASE, GEORGE, an American jurist; born in Portland, Maine, Dec. 29, 1849; educated at Yale and Columbia colleges, at which latter institution he was appointed assistant professor of municipal

law in 1875, professor of criminal law, torts and procedure in 1878 and dean of the Law School in 1891. He has published the *American Student's Blackstone* (1877), and contributed many articles to periodical literature.

CHASE, Irah, an American educator; born at Stratton, Vermont, Oct. 5, 1793, educated at Middlebury College and Andover Theological Seminary; ordained in the Baptist ministry; appointed, in 1818, professor of languages, etc., in the First Baptist Theological School; he remained here until 1825, when he became professor of ecclesiastical history in the Theological Institute, Newton Center, Massachusetts. He published many works in controversial theology. Died at Newton Center, Massachusetts, Nov. 1, 1864.

CHASE, Philander, an American Protestant Episcopal bishop, uncle of Salmon P. Chase; born in Cornish, New Hampshire, Dec. 14, 1775; died at Jubilee College, Illinois, Sept. 20, 1852. He graduated in 1795 at Dartmouth College, and three years later was ordained priest of the Protestant Episcopal Church. He held rectorates in New Orleans, Louisiana, and in Hartford, Connecticut, and in 1817 undertook missionary work in Ohio, where for a time he preached for three churches and took charge of the Worthington Academy. He twice visited England, obtained funds for educational work, and therewith erected Kenyon College, Gambier Theological Seminary, and Jubilee College—the latter in Illinois. In 1819 Mr. Chase was consecrated bishop of Ohio and in 1835 bishop of Illinois. Two volumes of *Reminiscences* and two works concerning Kenyon College are among his publications.

CHASE, Pliny Earle, an American educator; born at Worcester, Massachusetts, Aug. 18, 1820; died Dec. 17, 1886. He was graduated at Harvard in 1839, taught in Philadelphia, engaged in mercantile pursuits, but employed his leisure in scientific and philosophical studies. In 1871 he became professor of logic and philosophy in Haverford College, and further pursued his investigations in the fields of electricity, gravity, magnetism and kindred forces. His scientific papers were widely published, and he received the Magellanic gold medal of the American Philosophical Society in 1864.

CHASE, Samuel, signer of the Declaration of Independence; born in Somerset County, Maryland, April 17, 1741; died June 19, 1811. He was a lawyer by profession, an ardent patriot, a member of the Continental Congress from 1774 to 1778, and was one of a committee sent by Congress to urge Canada to unite with the colonies in resistance to England. After the war he was Maryland's agent, sent to recover from the Bank of England money deposited there by Americans before the war. In 1788 he became member of the Maryland convention which adopted the Federal constitution, and three years later chief justice of the general court of Maryland. In 1796 Washington appointed him justice of the United States supreme court, in the place of John Blair, resigned. Chase was soon known as "the American Jeffreys," at any rate, to the Jeffersonian Republicans. His fierce invective, and openly flaunted partisanship led to his impeachment in 1803, John Randolph being the leading spirit in the impeachment and subsequent trial; however, the Senate acquitted him.

CHASE, Thomas, educator, brother of Pliny Earle Chase; born in Worcester, Massachusetts, June 16, 1827; was graduated at Harvard in 1848, taught in the institution from 1850 to 1853; studied abroad; in 1855 became professor at Haverford College, near Philadelphia, and its president in 1875. He was one of the American revisers of the New Testament. He also edited and published works on the classics. He died in Providence, Rhode Island, Oct. 5, 1892.

CHASE, William Henry, an American military engineer; born in Massachusetts in 1798, and educated at the military academy at West Point. He served in the engineer corps, and was assigned to the fortification of the Gulf coast. Forts Pike, Macomb, Pickens, McRee and Barrancas were designed and constructed by him. In 1856 he was selected by President Pierce as superintendent of the Military Academy, but resigned from the army without entering on his duties. His views were those of the "Lost Cause," and he was a prominent Confederate in the seizure of Pensacola navy-yard. He took no other part in the war, and died in Pensacola, Feb. 8, 1870.

CHASE, William Merritt, an American artist; born in Franklin County, Indiana, Nov. 1, 1849; studied in New York and in Munich. As a figure, still-life and portrait painter, his works are remarkable for technical qualities, truth to nature, and artistic details. Mr. Chase was chosen president of the Society of American Artists, and also head of the School of Art at Shinnecock Hills. One of his best pictures, *Ready for a Ride* (1879), adorns the walls of the Union League Club in New York.

CHASIDIM, a Jewish sect. See Jews, Vol. XIII, p. 729.

CHASING. See Enchasing, Vol. VIII, p. 189.

CHASKA, the county seat of Carver County, southeastern Minnesota, on the left bank of the Minnesota River, and on the Minneapolis and St. Louis, the Chicago, Milwaukee and St. Paul and the Chicago, St. Paul, Minneapolis and Omaha railroads, 32 miles S.W. of St. Paul. The manufacturing industries of the city are quite important. It has a grain-elevator and some fine business blocks. Population 1895, 2,443.

CHASLES, Michel, a French mathematician; born at Épernon, Nov. 13, 1793. In 1846 he was appointed professor of higher geometry in the Faculty of Sciences, Paris. His principal works are a *History of Arithmetic* and treatises on *Higher Geometry* and on *Conic Sections*. He died Dec. 18, 1880.

CHASLES, Victor Euphémion Philarète, a French writer; born at Mainvilliers, near Chartres, Oct. 8, 1798. Early imbued with Rousseau's

ideas by his father, he was apprenticed at 15 to a Jacobin bookseller, with whom he was sent to jail after the restoration. Released by Chateaubriand's influence, he went to England, where he found employment in a bookseller's shop, and during his seven years' residence laid the foundation of his large knowledge of English literature. After his return to France, he contributed reviews of English books to the *Revue Encyclopédique*. In 1824 he published *Discours sur Jacques Auguste de Thou*, and in 1828 *Tableau de la Langue et Littérature Française, 1500–1610*. In 1837 Chasles became librarian of the Bibliothèque Mazarin, and in 1841 professor of northern languages at the Collège de France, which chair he filled until his death at Venice, July 18, 1873.

CHASSÉ, David Hendrik, Baron, a Dutch soldier; born in Thiel, in Guelderland, Holland, March 18, 1765. He began his military career at 10 years of age. At 16 he was lieutenant, and in 1787 became captain. He entered the French service, and for his fondness for bayonet charges Napoleon gave him the name of "General Bayonet." Louis Bonaparte made him a baron in 1809, and in 1815 he fought at the head of the Dutch contingent at Waterloo, against his old comrades, the French. As governor of Antwerp, he defended the citadel bravely for three weeks against the Belgians and French in 1832. He died at Breda, May 2, 1849.

CHASSEPOT, Antoine Alphonse, a French inventor; born March 4, 1833. He was an employee in the Paris arsenal of St. Thomas, where he became an official in 1858, and in 1863 brought before the government the model of his rifle, adopted three years afterward. This weapon was the standard arm of the French soldiery in the Franco-Prussian war (1870–71), but it has given place to the small-bore Lebel rifle. In operation it much resembled the German needle-gun, the cartridge base being composed of a fulminating compound, which was ignited by a needle thrust into it by pulling the trigger.

CHASSEUR, a name given to certain light troops in several of the European armies. In 1815, battalions of chasseurs were enrolled in the French army. The name is now generally applied to special corps of light troops designed for rapid movements, whether cavalry or infantry.

CHASSEURS DE VINCENNES, one of the names given to a famous corps in the French army. In 1835, when certain improvements had been made in the French rifle, the Duke of Orleans ordered the formation of a company of riflemen armed with new rifles. They proved so efficient as sharpshooters, or *tirailleurs*, that in 1838 a whole battalion was organized, which was called the *Chasseurs de Vincennes*.

CHASTELLUX, François Jean, Marquis de, a French soldier and author; born in Paris in 1734. He served as major-general during the American Revolution, under Rochambeau, securing the friendship of Washington and Jefferson; was a member of the French Academy, and wrote several works, including *Travels in North America*, an *Essay on Public Happiness*, and *The Advantages to Europe from the Discovery of America*. He died in Paris, Oct. 28, 1788.

CHASUBLE, an ecclesiastical service-robe. See Costume, Vol. VI, p. 462.

CHAT, the common name of birds of the thrush family, belonging to the genera *Pratincola* and *Saxicola*. They are principally African, but species are found in Europe and America. The chats are valuable insectivorous birds. See Wheat-ear, Vol. XXIV, p. 537.

CHATEAUGAY, lakes, a river and a town in Franklin County, northeastern New York. The Upper Chateaugay Lake, on the boundary between Franklin and Clinton counties, is the source of the Chateaugay River. The river runs north-northwest, through the Lower Chateaugay Lake, into Canada, then northeast into the St. Lawrence, just below Lake St. Louis. It is about 90 miles in length. The upper lake is about eight miles long and five wide, the lower lake five miles long and three wide. The town of Chateaugay is on the Vermont Central railroad, a short distance east of the river, in the northwest corner of Franklin County. Its industries are the manufacture of dairy products. Population 1890, 1,172.

CHÂTEAUROUX, Marie Anne, Duchesse de, the fourth daughter of a French noble family whose daughters were the mistresses of Louis XV of France. Her arrogant rapacity made her many enemies. Separated from the royal libertine in 1744 at the instance of the Bishop of Soissons, she regained her power over him, and was preparing revenge, when she died suddenly, Dec. 8, 1744, and probably from the effects of poison.

CHÂTELDON, a village in the northeast of the department of Puy-de-Dôme, France, not far from the right bank of the Allier River, nine miles N. of Thiers. There are mineral springs here, the water of which is exported for table-use. Population, about 2,000

CHÂTELET, Gabrielle Emilie, Marquise de, a mistress of Voltaire; born in Paris, Dec. 17, 1706; the daughter of the Baron de Breteuil, and highly educated. She married the Marquis de Châtelet in 1726, and from 1735 lived with Voltaire for 12 years. Later she sustained similar relations with Saint-Lambert. She died at Luneville, Aug. 10, 1749. See Voltaire, Vol. XXIV, p. 287.

CHÂTELGUYON, a spa near Riom, in the department of Puy-de-Dôme, France. The springs are numerous, and the waters, like those of Carlsbad, are taken for digestive disorders, congestion of the liver and rheumatism. Some of the springs are thermal. The place is the source of the Gubler waters, impregnated with chlorid of magnesium. Population 1891, 2,000.

CHATFIELD, a city of Fillmore County, southeastern Minnesota, on the Root River and on the Chicago and North-Western railroad, 50 miles E.S.E. of Winona. It is in a rich agricultural district, from which it derives a large trade. Population 1895, 1,435.

CHATHAM, a town of Barnstable County, eastern Massachusetts, on the Atlantic, at the southeast-

ern point of Cape Cod. It is a summer resort; has good schools and two lighthouses. Population 1890, 1,954.

CHATHAM, a port of entry of Northumberland County, northeastern New Brunswick, on the south bank of the Miramichi River, six miles below Newcastle, and on the Intercolonial railroad. It has a large trade in lumber and salmon. Population 1891, 5,644.

CHATHAM, a town and capital of Kent County, southwestern Ontario, on the Thames River, and on the Canadian Pacific, the Erie and Huron and the Grand Trunk railroads, 45 miles E. of Detroit, Michigan. It manufactures machinery and woolen goods, and has a large trade in lumber, potash, tobacco and soap. Population 1890, 6,180.

CHATHAM VILLAGE AND CHATHAM FOUR CORNERS, a thriving village of Columbia County, southeastern New York, on the Boston and Albany and the Kinderhook and Hudson railroads. It has cotton and paper mills, blast-furnaces and machine-shops. It is a junction for the Boston and Albany, the New York and Harlem and the Harlem Extension railroads. Population 1890, 1,912.

CHATOYANT, a term made use of in mineralogy to designate the luster of color of stones like the cat's-eye. In this and similar stones is found a floating luminosity resembling the appearance of the eyes of a cat.

CHATRIAN, ALEXANDRE, a French novelist. See ERCKMANN-CHATRIAN, in these Supplements.

CHATSWORTH, the country seat of the English Dukes of Devonshire, situate upon the river Der-

CHATSWORTH.

went, 20 miles W. of the county town of Derby, and in the midst of the romantic scenery of the Peak district. It is considered the finest private residence in the world, and without question is the stateliest of the country seats of England's nobility. William the Conqueror gave a vast domain, including the site of the present palace, to his natural son, William Peveril. Sir William Cavendish purchased the estate in the reign of Queen Elizabeth, and in 1553 commenced to build a mansion here. It was completed by his widow, "Bess of Hardwick," afterward Countess of Shrewsbury. Their descendant, the first Duke of Devonshire, commenced in 1706 the erection of the present building, the north wing being added by his successor in 1820. Quadrangular in design, with massive Doric columns and a façade 720 feet, or, including the terraces, 1,200 feet long, the mansion stands in grounds of over two thousand acres, inferior in natural and artificial beauty only to those of Versailles. Within its walls the most famous art collections in England are grouped; its library is world-known; in the glades of its park six thousand wild red deer add a studied degree of the picturesque. Within the quadrangle is an open court, in the center of which is a splendid fountain, with a statue of the god Orion seated on the back of a dolphin. The interior of the palace is adorned with everything that untold wealth and refined taste could procure. Many of the rooms are hung with tapestry and ornamented with carvings, while all the pictures are gems of art. The entrance hall is a grotto of magnificent marble, filled with pictures and curiosities of the rarest value. The picture-gallery and the gallery of statuary contain many gems by Holbein, Titian, Teniers, Murillo, Reynolds, Landseer, Canova, Thorwaldsen, Chantrey and Wyatt. But the gardens and conservatory are the gems of the establishment. They were planned and laid out by Loudon and Paxton. The housekeeper often receives over $250 per day in gratuities for showing visitors the establishment. The conservatory, unrivaled in Europe, covers nearly an acre, measures 300 by 150 feet, is 65 feet high, and has a carriage-road through it. Hobbes, the philosopher, lived much at Chatsworth. Mary Queen of Scots was confined 13 years in the ancient tower which stands near the entrance of the palace. On the buttress of the bridge is a curious group of statuary; it consists of a man with a child in his arms and a young woman. There is a tradition connected with it. One of the daughters of this noble house became a mother before she was a wife. In her misery she left the palace at midnight to throw herself and child into the river; her unhappy father followed her and prevented this double crime.

Chatsworth and the district around it, immortalized in *Peveril of the Peak*, and in close proximity to Haddon Hall, are annually visited by many tourists.

CHATTAHOOCHEE, a river of Georgia, about 550 miles long, and navigable for small boats for 325 miles. It rises in the Blue Ridge, in the northeast part of the state, flows south, forming the boundary between Georgia and Alabama, and unites with Flint River to form the Appalachicola.

CHATTANOOGA, a city of Tennessee, and county seat of Hamilton County, located near the southern boundary of the state, on the south bank of the Tennessee River, at the mouth of a valley formed by Mission Ridge on the east and Lookout Mountain on the west. With the close of the Civil War came a remarkable growth. In 1890 the city contained three hundred manufacturing establishments, several large hotels, horse and electric street-railways, gas and electric lights, water-works, and large jobbing houses. Chattanooga has nine trunk lines of railway. The United States government

has expended four million dollars in removing obstructions from the Tennessee River, and the river traffic is considerable. A new bridge of steel and iron, built by the county at a cost of $225,000, now spans the river at this point, and is free for carriages and foot-passengers. The city is supplied with water taken from the river above the city, pumped through 63 miles of mains, with a capacity of twenty million gallons daily. The Grant Memorial University (Methodist) is located here, and includes a classical school, medical school, law school, theological school, and the preparatory departments. Other educational institutions are a Dominican convent, numerous public schools and a commercial college. The great bend of the river, sweeping around the city, gives 11 miles of deep water-front, and supplies unusual transportation facilities for the manufacturing and commercial establishments. Iron ore abounds in the vicinity, and three hundred tons are produced daily by the smelting and puddling works in the city. Population 1870, 6,093; 1880, 12,879; 1890, 29,113. The city was the scene of severe fighting during the Civil War. Within sound of its site were fought the battles of CHICKAMAUGA, MISSIONARY RIDGE and LOOKOUT MOUNTAIN (q.v.), three of the fiercest and most sanguinary of the entire conflict. Here the United States government has laid out a national military park, on the site of the battlefield. See CHATTANOOGA, Vol. V, p. 445.

CHATTANOOGA, SIEGE AND BATTLE OF. Victorious at Murfreesboro, the victim of a panic at Chickamauga, a battle he had contested only after a score of orders from Washington, Rosecrans had retired with the Union army behind the defenses of Chattanooga. Here he threw up intrenchments fit for a permanent fortress. The Confederate General Bragg, speedily ran a line of rifle-pits from the northern spur of Missionary Ridge over the heights, across the valley and over Lookout Mountain, whence his cavalry pickets patrolled nearly to Bridgeport. Rosecrans was practically "bottled up in Chattanooga," and was soon pressed for forage and rations. Ten thousand horses died, the survivors were too weak for transport or battery service, the troops were on half rations, and ammunition was scarce. Matters stood thus when, on September 29th, Grant, fresh from the capture of Vicksburg, was ordered to relieve Chattanooga. With Rosecrans superseded by Thomas, Grant arrived in the beleaguered city on Oct. 23, 1863. He was confronted by the knotty problem of supplies. To throw reinforcements into Chattanooga with insufficient rations for its present garrison, and with the enemy practically in possession of all the lines of communication, would hasten famine and insure surrender. Ordering Thomas and Burnside to strengthen their intrenchments and to hold them at all hazards, he waited meanwhile for Sherman, who was marching from the Mississippi. Hooker guarded the Nashville railroad below Bridgeport, ultimately moving in closer, when, by a clever stratagem, a good road for supplies but eight miles long was uncovered and seized for use. Supplies poured into Chattanooga, and the lean men in the trenches began to feel like fighting again. As Sherman plodded toward Chattanooga, Bragg made his worst error of judgment. He sent 15,000 of his oldest and steadiest infantry, covered by 5,000 Confederate cavalry, to attack Knoxville. By November 14th. Sherman was at Bridgeport and reporting to Grant, Then he threw his men across the Tennessee on pontoons, and formed a line on South Chickamauga Creek, overlapping Bragg's right flank. Hooker advanced and placed himself in the Confederate rear. When these movements were complete, Thomas was to charge out of Chattanooga and drive in the Confederate front. On November 23d, Thomas's men drove the Confederates a full mile, carried his advanced earthworks and rifle-pits, and at once occupied them and changed their fronts. This new line gave Orchard Knob to Grant, whence to watch "the Battle in the Clouds." Sherman got intrenched securely across Bragg's flank by the 24th, while Hooker had swept everything before him. The battle proper began on the 25th by Hooker storming the earthworks on the east face of Missionary Ridge. Sherman advanced, bore the brunt of the battle and ultimately held his ground. As Hooker got in action, Thomas's army rushed out of its earthworks and swept up the slopes in their front. Work after work was carried. The advance was irresistible. Bragg's center was broken, and the Confederate retreat soon became a rout. Night put an end to the pursuit. The Union troops engaged numbered about sixty thousand, the Confederates fifty thousand. The Union losses were 700 killed and 4,850 wounded and missing. Grant's soldiers captured six thousand prisoners. Chattanooga was the Worcester of the Confederacy. Its cause was thereafter hopeless, and Grant, commander-in-chief of the Union armies, moved forward to crush secession's forces in detail.

CHATTEL MORTGAGE. See PLEDGE, Vol. XIX, p. 220.

CHATTELS. See PERSONAL ESTATE, Vol. XVIII, pp. 664, 665.

CHATTERER. See WAXWING, Vol. XXIV, pp. 460, 461.

CHAUDET, ANTOINE DENIS, a French sculptor and painter; born in Paris, March 31, 1763. He executed many works of art, including contemporaneous portraits of Napoleon. Died in Paris, April 19, 1810. See SCULPTURE, Vol. XXI, p. 564.

CHAUDIÈRE, a lake in the Ottawa River, about 50 miles above Ottawa city. It is merely an expansion of the river, 15 miles long.

CHAUDIÈRE, a river of Central Quebec, Canada. It flows through Lake Megantic, thence north and northwest into the St. Lawrence River, eight miles above Quebec. The falls of Chaudière, a beautiful cataract 100 feet in height, are in this river, 2½ miles from its mouth.

CHAUMONOT, JOSEPH PIERRE MARIE, a Jesuit missionary; born near Chatillon-sur-Seine, France, in 1611; died near Quebec, Feb. 21, 1693. He labored among the Canadian Indians and wrote a grammar of the Huron language.

CHAUNCEY, ISAAC, an American naval officer; born at Black Rock, Connecticut, Feb. 20, 1772.

At an early age he went to sea, and before he had completed his twentieth year he commanded a ship in the merchant service which belonged to John Jacob Astor. When the navy was organized in 1798, Chauncey was appointed lieutenant, and rose to be captain in 1806. In the war with Tripoli he served with gallantry. During the War of 1812, Captain Chauncey commanded on the lakes, superintended the building of a fleet, co-operated in the capture of York (Toronto), and put to flight the British fleet in York Bay. After the war he commanded the Brooklyn navy-yard, negotiated a treaty with Algiers while commanding the Mediterranean squadron, and at the time of his death was president, with the rank of commodore, of the Board of Navy Commissioners at Washington, where he died, Jan. 27, 1840.—His son, JOHN S. CHAUNCEY, was born in New York about 1800. He entered the navy in 1812, and in 1822 rendered excellent service, in command of the sloop *Peacock*, by capturing a fleet of pirates off the coast of Cuba. After departmental service from 1838, he commanded the *Susquehanna* in the Civil War. He was promoted to the rank of commodore in 1862; retired in April, 1869. He died in Brooklyn, New York, April 10, 1871.

CHAUNCY, CHARLES, an American educator; born in Yardleybury, Hertfordshire, England, in 1592, of a famous Hertfordshire family, one of whose members is the historian of his native country. He graduated at Cambridge in 1613, and afterward taught Hebrew and Greek there. He became a clergyman, but so strong were his Puritan convictions that he was continually in trouble with the higher church authorities. In 1638 he found in New England the liberty of conscience denied in Old England. The church of Scituate called him to be its pastor, and here he remained for twelve years, at the end of which time he made ready to return to England, to his old congregation of Ware; but Harvard College was just then without a president, and he accepted the office, which was offered, serving acceptably up to the time of his death. He was the second president of Harvard, and held the office for eighteen years. He died at Harvard, Feb. 19, 1672.

CHAUTAUQUA, a unique summer resort in Chautauqua County, western New York, on Chautauqua Lake, and on the Chautauqua Lake railroad. It was formerly called Fair Point, and was a favorite place for Methodist camp-meetings, but in 1874 the grounds were purchased by the Chautauqua Sunday School Assembly. Many lots have been purchased, upon which neat cottages have been erected; there are also numerous boarding-houses and hotels, and large pavilions for religious services and instructions. Each year, during July and August, summer schools of language and art are held there, popular lecturers being secured to address the large classes. Crowds of people annually throng the Chautauqua grounds. Sunday school and temperance work, as well as Bible study, receive attention.

CHAUTAUQUA LAKE, in Chautauqua County, northwestern New York, a picturesque sheet of water, 18 miles long and 3 miles in breadth at its widest point. It is about 1,300 feet above tide-water and 726 feet higher than Lake Erie. Steamers sail between Mayville and the flourishing town of Jamestown, which lies at the opposite end of the lake. The Indian name means "bag tied in the middle," and refers to the fancied shape of the lake.

CHAUTAUQUA LITERARY AND SCIENTIFIC CIRCLE, an incorporated institution for study and instruction, suggested and largely promoted by Hon. Lewis Miller of Akron, Ohio. It was organized in 1878 at Chautauqua, New York, with Lewis Miller as president of the association, and Rev. John H. Vincent, D.D., LL.D. (now a bishop of the Methodist Episcopal Church), as chancellor of the faculty. The purpose of the circle is to promote habits of reading, and study in nature, art, science, and in secular and sacred literature, in connection with the routine of daily life; to give college graduates a review of the college course; to secure for those whose educational advantages have been limited the college student's general outlook upon the world and life, and to develop the habit of close, connected, persistent thinking.

It endeavors to encourage individual study in lines and by text-books which shall be indicated; by local circles for mutual help and encouragement in such studies; by summer courses of lectures and "students' sessions" at Chautauqua, and by written reports of each year's work.

Any person may join the circle upon payment of the annual membership fee, which is 50 cents. No entrance examination is necessary. Persons may enter for one year, but the full course is four years, after which the graduate receives a diploma. The course of studies is directed from the center of the circle, and may be pursued at home and in the local circles. Attendance at the summer meetings at Chautauqua, New York, is urged, but is not imperative. The meeting extends usually from about July 5th to August 25th, each year. The headquarters of the department of instruction are at Plainfield, New Jersey, and *The Chautauquan*, the official organ, is published at Meadville, Pennsylvania.

There are over fifty Chautauqua assemblies in the United States, Canada, Great Britain, Japan, India, South America, Australasia and South Africa, with a membership of half a million persons. All are modeled in organization and methods upon the original Chautauqua assembly, but are independent in management. Catholics have recently initiated a similar movement, and under the name of the "Catholic Summer School" have held successful gatherings at Plattsburg, New York, and have organized reading-circles and study-classes on a large scale.

CHAUVEAU, PIERRE JOSEPH OLIVIER, a Canadian statesman, born in Quebec, May 30, 1820. Educated at the Seminary of Quebec, he afterward studied law, and was admitted to the bar in 1841, and three years later entered political life as a reform member for the county of Quebec. In 1851 he was solicitor-general for Lower Canada; in 1853 provincial secretary and member of the executive council; he was superintendent of education for his native city in 1855, and after the confederation was

elected to the House of Commons and the Quebec House of Assembly. He held the office of premier of the latter (1867–73), speaker of the Dominion senate (1873–74), became president of Quebec Harbor Commission in 1876, and sheriff of Montreal in 1877. Mr. Chauveau labored much for the educational cause, and his writings in prose and poetry were valuable. He died in Quebec, April 4, 1890.

CHAUVENET, WILLIAM, an American mathematician; born at Milford, Pennsylvania, May 24, 1820; was graduated at Yale in 1840; became professor of mathematics in the United States Naval Academy at Annapolis, which he was largely instrumental in establishing. From 1859 to 1869 he was professor of mathematics and astronomy at Washington University, St. Louis, being chancellor from 1862. He wrote many valuable works on mathematics, and originated numerous improvements in mathematical methods. Among his published writings are *Plain and Spherical Trigonometry* (1850); *Manual of Spherical and Practical Astronomy* (2 vols., 1863); and *Elementary Geometry* (1870). He died in St. Paul, Minnesota, Dec. 13, 1870.

CHAUVINISM, a term that has come to mean an extravagant and absurd patriotism and pride in one's own country, with a corresponding enmity toward and contempt for foreign nations. It is the French equivalent for the "jingoism" of the London music-halls after Lord Beaconsfield's return from the Congress of Berlin in 1878. The origin of the word is due to Chauvin, the name of a veteran soldier of the first empire in Scribe's *Soldat Laboureur*, whose admiration of Napoleon was unbounded, and who honored even "the shadow of his shoe-tie."

CHAVANNES, PUVIS DE. See PUVIS, in these Supplements.

CHAY-ROOT. See MADDER, Vol. XV, p. 177.

CHAZARS, a people of the Finnish stock, known in the seventh century on the shores of the Caspian; in the ninth century their kingdom occupied the southeast of Russia, from the Caspian and the Volga to the Dnieper. They were singularly tolerant of all religions; a large part of the nation adopted the Jewish faith from Jews who fled from the persecutions of Emperor Leo, and Cyril converted many to Christianity in the ninth century. The power of the Chazars was ultimately broken in the twelfth century, by the Byzantine emperors and the Russians.

CHAZY EPOCH, the name given by American geologists to that division of Silurian time during which the chazy limestone of New York, Canada, etc., was formed.

CHEATHAM, BENJAMIN FRANKLIN, an American soldier; born in Davidson County, Tennessee, Oct. 20, 1820; died at Nashville, Tennessee, Sept. 4, 1886. He served as a captain and colonel of volunteers during the war between Mexico and the United States, at the conclusion of which he became major-general of the Tennessee militia. He was a farmer till 1861, at which time he enlisted in the military service of the Confederate states, in which he continued till the close of the war, rising successively to the grades of major and lieutenant-general. He distinguished himself at the battle of Belmont in 1861, and commanded a division in General Bragg's army in his campaign into Kentucky in 1862. He participated in the battles of Perryville, Stone River, Chickamauga, Missionary Ridge, Resaca, Marietta, in the battles near Atlanta, in the battle of Jonesboro, Georgia, Franklin and Nashville, Tennessee, in which he commanded an army corps as lieutenant-general, and also in the battle of Bentonville, North Carolina, soon after which he surrendered to the Federal forces. After the war he engaged in agricultural pursuits. In 1885 he was appointed by President Cleveland postmaster at Nashville, Tennessee, and died in the incumbency of that office.

CHEATING. See FRAUD, Vol. IX, p. 727; THEFT, Vol. XXIII, p. 233.

CHEAT RIVER, a river of West Virginia, which rises in Pocahontas County, among the Elk Mountains; flows north-northeast till it comes to Preston County, where it turns northwestward, enters Pennsylvania, and joins the Monongahela two miles north of the boundary. Its length is somewhat over 80 miles. Its name is derived from the apparent variableness of its volume.

CHEBOYGAN, a city and the capital of Cheboygan County, Michigan, at the northern extremity of the southern peninsula, on a river of the same name and on Lake Huron. It has saw, planing and grist mills; also a large grain trade. Population 1895, 6,956.

CHECK. See CHEQUE, Vol. V, pp. 583, 584.

CHECKERS. See DRAUGHTS, Vol. VII, pp. 444–446.

CHEDDAR, a village in Somersetshire, southwestern England, two miles S.E. of Axbridge, celebrated for the production of the Cheddar cheeses. Population 1890, 2,200.

*CHEESE. The American process of making cheese differs in many features from that followed in other countries. While, in some localities in the United States and Canada, different kinds of fancy cheese are produced (brick, Swiss and some of the softer brands), the Cheddar is the favorite. The method of making the Cheddar cheese as practiced in the United States and Canada is given herewith.

The milk is collected from the farmers of the neighborhood. When the factory is owned by a private individual, the milk is purchased and the farmers paid for it. When the factory is co-operative—owned by the farmers themselves—they are paid for their milk by a proportionate share of the profits. The necessity of pure milk, sweet, and entirely free from taints of all kinds, is very strongly emphasized. The milk is brought to the factory in the morning, and is usually all in by ten o'clock.

The development and management of acid in the milk is the salient feature in the modern method of manufacturing Cheddar cheese. As is now generally known, the acid in milk is produced by minute organisms, which gain access to the milk from the air, the vessels in which the milk is kept, etc., and multiply with marvelous rapidity. These organisms, or germs as they are more commonly called, live upon the albuminous constituents of the milk and the sugar, breaking up a portion of the latter, and thus producing lactic acid. When the milk is

*Copyright, 1897, by The Werner Company.

brought to the factory it is placed in the cheese-vat and heated to a temperature of from 82° to 86°. It is then tested for acid. If, in the judgment of the maker, there is a sufficient amount of acid present, the rennet is added and the milk permitted to coagulate. If there is not a sufficient amount of acid present in the milk, it is held at the temperature before mentioned and "ripened." By the term *ripen* is meant, to develop a certain amount of acidity—to proceed a certain distance toward souring. By this means, time is saved for the maker, because less time is required to develop acid in the after process. Again, the acid aids in expelling the whey, and thus makes a firmer, stiffer curd. The main reason, however, why it is better to develop the acid before the introduction of the rennet will probably be ascertained when the relation between the rennet, on the one hand, and germs which produce acidity, on the other, has been discovered. At the present time this relation is not well understood. It is of the utmost importance that the maker know the condition of the milk as regards acidity, or ripeness. He ascertains this in a sufficiently accurate manner, for his purpose, by the application of what is known as the rennet-test. When the milk has been heated to a temperature of 84° F., 160 cubic centimeters of the milk are taken in a tin cup. Five cubic centimeters of the rennet are then taken, and placed in 45 cubic centimeters of lukewarm water. Five cubic centimeters of this mixture are then added to the milk, thoroughly stirred for an instant, and then permitted to remain quiet. With a small spatula or common case-knife the milk is gently agitated, in order that the exact instant when coagulation begins may be noted. If the milk is in the proper condition for the introduction of the rennet, coagulation will begin in two minutes after the rennet has been introduced. If a longer time elapses, the milk is not ripe enough to receive the rennet, and it must be held at a temperature of from 84° to 86° F. until it ripens. If coagulation begins in less than one minute, the milk is riper than it should be, and the rennet must be added immediately and the process hastened as much as possible. To make the best cheese, coagulation should begin, by the test, in from one minute and three quarters to two minutes.

The milk being at a proper degree of ripeness, and at a temperature of from 84° to 86°, the color may be introduced, if any be used, and then the rennet. In the commercial cheese factories of America very little rennet is prepared by the cheese-maker, who uses almost exclusively the commercial extract. The amount of rennet used depends upon the season of the year, the length of time in which it is desired to market the cheese, the strength of the rennet and the condition of the milk as regards ripeness. In general, it may be said that enough rennet should be used to coagulate the milk and render it fit for cutting in from 30 to 45 minutes. A floating thermometer is kept in the milk during the whole process, in order that the temperature may be observed conveniently and frequently. Immediately after the rennet is introduced, the milk should be gently but thoroughly stirred for about one minute, when it is quieted by passing the dipper gently over the surface, and from this time until the curd is in proper condition to be cut, the milk should be entirely undisturbed—even the vat should not be jarred. If the milk is agitated at this time, a loss of butter-fat results, as the latter exists in the milk in the form of minute globules, which are caught mechanically as the casein coagulates. The rennet has no action upon the fat.

The time at which the curd is in the best condition for cutting is determined by passing the first finger along about half an inch under the surface, having first split the curd with the thumb. If the curd breaks clean before the finger and leaves only moisture in its wake, it is in the proper condition to be cut. If cut too soon, the curd does not retain its form and body in the after-manipulation, and a great deal of butter-fat will be lost in the whey.

The curd is cut with knives made especially for the purpose. The object in cutting is to facilitate the separation of the curd from the whey, and when completed the curd is in the form of small cubes about one fourth of an inch in size. The knife should be held in warm water for a few moments before using, so that it will be of the same temperature as the curd. It should be introduced very carefully, placing it flat on the surface of the curd and cutting downward with the lower end until the latter rests on the bottom of the vat; then it should be moved carefully from one end of the vat to the other, turning at the ends in such a manner that the curd will be always cut and never broken. When the curd has been cut one way, it should be permitted to rest for a moment, when it is cut crosswise, and then once more as it was cut the first time. After being permitted to remain undisturbed for a few moments, the hands are very carefully placed in the vat, and whatever pieces of curd along the sides or in the corners of the vat have escaped cutting are gently raised to the surface and cut.

After the cutting is completed, the curd is stirred very gently, giving it a rotary motion, so that the pieces of curd will fall apart. When the curd has been stirred in this manner for five to ten minutes, heat is gradually applied to the water surrounding the vat, and the stirring is continued. This part of the process is commonly called "cooking" the curd, although the temperature is seldom raised above 98° F. From the time the curd is cut until it is put to press, it is handled with a view to accomplishing two things: First, to expel the moisture, retaining only what is necessary to make a palatable cheese and insure perfect curing; second, to develop a certain amount of acidity. In order to develop the acid evenly and continuously, the temperature is raised at the rate of about one degree in two and a half to three minutes. If raised more rapidly, a film forms over the curd, preventing the escape of whey and injuring the cheese.

While the temperature is being raised, the curd should be stirred continually, but as gently as possible. When small vats are used, the arms are bared and the stirring done by hand; when the vat is large, the curd is stirred with a wooden rake made especially for the purpose. The fat, which is the most valuable constituent of cheese, is held in the

curd mechanically, and if the curd is bruised or agitated unnecessarily, a considerable amount of the fat will become disengaged from the curd and be lost in the whey. Heating is discontinued when a temperature of 98° F. has been reached, and the curd remains in the whey until the required amount of acidity has been developed. It would be possible to develop all the acidity in the curd, but it would be a slow process, requiring a great deal of time and careful attention, and there would be danger of retaining a surplus of moisture in the curd, making a soft cheese, easily soured. If an excess of acid is developed, the cheese will invariably be of poor quality, hard and slow in ripening, and the "buttery" consistency and "nutty" flavor of first-class cheese be lost.

The presence of acid in the curd is determined by what is known as the hot-iron test. A bar of iron (a piece of iron pipe is quite commonly used) is heated until almost at a red heat; a handful of the curd is then taken, firmly pressed to squeeze out the whey, and applied to the surface of the iron with a rubbing motion and slowly withdrawn; if acid is present, it will be manifested by numerous fine threads between the iron and the piece of curd, and the degree of acid is represented by the length and number of these threads. This test is in general use throughout the United States and Canada, and has been found entirely satisfactory for all practical purposes, but up to the present time it has not been scientifically explained. It is believed that the presence of certain kinds of germs in a marked degree increases the number and length of threads on the hot iron, almost without regard to the amount of acid present, but as germs of this kind are not present in milk of normal condition, they very seldom interfere with the application of the test.

The amount of acid developed before the curd is removed from the whey necessarily varies with the season and the locality. In making spring cheese the curd is usually taken from the whey when threads an eighth of an inch long appear on the hot iron; in summer, when the threads are about one fourth of an inch in length. In the fall, somewhat more acid is developed at this stage. When the proper amount of acid is present, the whey is drawn out of the vat by a siphon, the curd well stirred and piled on each side of the vat to drain and become matted; an open channel is left in the center of the vat, in order that the whey may flow out as the curd settles and expels it. When the curd is matted firmly it is cut in blocks six or eight inches across, so that it can be turned and piled. The blocks of curd should be turned at intervals of 10 to 15 minutes, to give the whey opportunity to flow off easily, and then piled, two deep at first, and afterward three and four deep. The whey should not be permitted to stand in pools on the curd at this point; if this is permitted, there is danger of sour flavors being developed in the cheese. It is important that the temperature of the curd be maintained at from 94° to 96° while in this matted condition. This is necessary, not only for the development of acid, but to secure the proper mechanical condition; if the makeroom be cold, the curd should be covered with heavy cloth. The curd is permitted to remain in this matted condition until it becomes of the proper mechanical condition and shows the presence of from ½ to 1½ inches of acid as measured by the hot-iron test. When in the best condition for grinding, the curd is flaky, and when torn apart splits instead of breaking, resembling the breast of a chicken when torn apart in a similar manner.

The curd is ground in mills made for the purpose, which leave it in small pieces; in some, irregular in shape; in others, in the form of small cubes. The curd should be at a temperature of 90° to 92° when ground. After grinding, the curd is stirred for 10 to 15 minutes, for the double purpose of giving the surplus whey an opportunity to pass off and to expose the curd to the air. During the stirring period the character of the curd changes somewhat; it becomes smooth and silky to the touch, and the odor of new-made butter develops. When this mechanical condition develops, and when squeezed firmly in the hand, a mixture of whey and butter-fat oozes out between the fingers, the curd is ready for salting. The amount of salt varies with the season, the condition of the curd as regards moisture, and the market for which the cheese is intended. When quick-curing cheese is desired, less salt is used than when it is intended to keep the cheese in the curing-room for several months. In the spring, when it is desired to place the cheese on the market within 30 to 40 days, 1⅓ to 1⅔ pounds of salt are used to the hundred pounds of curd, while in the latter part of the season, when the cheese is held for the winter market, as much as 2½ to 3 pounds of salt are used. The salt is weighed and scattered over the curd as evenly as possible. The curd is again stirred for ten to twenty minutes until the salt is dissolved and the harsh, rough feeling caused by the salt gives way to a smooth, soft feeling. If there is a disagreeable odor present, the stirring is continued ten to twenty minutes longer

When the curd has reached the proper mechanical condition after salting, it is placed in hoops for pressing. These hoops are made of galvanized iron, and are of different sizes. The usual size will hold enough curd to make a sixty-pound cheese; some hoops are less than half this size, and others hold enough curd to make but ten pounds of cheese; the latter are used for making the Young America cheese of our large markets. The hoops are placed in warm water until of the same temperature as the curd, after which they are lined with cheesecloth and a circular piece of muslin placed in the bottom. They are then filled with the curd and another piece of muslin placed on top, covered with a circular piece of wood called a "follower," which fits into the hoop closely. The hoops are then placed in a gang-press, in which pressure is applied by means of a screw moved with a lever. The pressure is applied with a view to securing a close knitting together of the curd, and is consequently put on very slowly and gradually. After the pressure has been applied for three quarters of an hour, the hoops are taken from the press, the cheese taken out, and the bandages neatly dressed, after which the cheese is replaced in the hoops and pressure again applied.

They are left in this condition for 15 to 24 hours. The cheese is then removed from the hoops, the cloths removed from the ends, and placed on shelves in the curing-room. The end of the cheese exposed to the air is greased with cheese-grease prepared especially for the purpose. Butter may be used for greasing with excellent results, but the prepared grease is less expensive and answers the purpose very well. The grease is hot when applied, and is well rubbed in, the object being to make a tough rind on the end of the cheese. The next morning the cheese is turned and the other end greased. On the side of each cheese is marked the date on which it was made.

The curing-room is kept at a temperature of from 70° to 80° during the early stages of curing, and this temperature should be maintained as evenly as possible. Each day the cheese is turned, and the upper surface well rubbed with the hand. Properly made Cheddar cheese reaches its best condition in from three to six months, but the demand of the consumer for a mild, soft cheese has lead the cheese-makers to place them upon the market within three to six weeks. See also CHEESE, Vol. V, pp. 455, 456; also AGRICULTURE, in these Supplements.

HENRY C. WALLACE.

CHEESE–HOPPER OR CHEESE–MAGGOT, the larva of a fly (*Piophila casei*) which deposits its eggs in cheese. The larva has the power of leaping by suddenly bending its body.

CHEESE–MITE. See MITE, Vol. XVI, p. 529.

CHEEVER, EZEKIEL, an American educator, was born in London, England, Jan. 25, 1614; died in Boston, Aug. 21, 1708. He received a classical education, and in 1637 emigrated to America to secure "greater freedom of worship." Landing in Connecticut, he became one of the founders of New Haven (1638); was schoolmaster there, and later, at Ipswich, 11 years; at Charleston, 9 years, and at Boston, 38 years, where Cotton Mather was one of his pupils. While at New Haven he wrote *Accidence, a Short Introduction to the Latin Tongue*, which passed through twenty editions and was a standard New England text-book for more than one hundred years. He also published a book entitled *Scripture Prophecies Explained*, giving his views in regard to the millennium.

CHEEVER, GEORGE BARRELL, clergyman and author; born at Hallowell, Maine, April 17, 1807; died at Englewood, New Jersey, Oct. 1, 1890. He was a graduate of Bowdoin in 1825, of Andover Seminary in 1830, and became pastor of a Congregational church in Boston. He was an active controversialist, writing against Unitarianism in *A Defense of the Orthodoxy of Cudworth*, against intemperance in an allegory entitled *Inquire at Deacon Giles' Distillery*, and against slavery, the operation of railroads on Sunday, the banishment of the Bible from public schools, and other questions of popular interest. His tract on temperance produced great excitement, and he was tried for libel and imprisoned. He traveled in Europe, and while there contributed letters to the New York *Observer;* on a second trip he was corresponding editor of the New York *Evangelist.* In 1839 he became pastor of Allen Street Presbyterian Church, in New York City, and from 1846 to 1870 had charge of the Church of the Puritans, which was organized for him. He was the writer of books on religious, social and literary topics, his best work being *Lectures on the Pilgrim's Progress* (1843). Among his other books are *Lectures on Bunyan's Holy War; Windings of the River of the Water of Life; the Voices of Nature to the Soul of Man; Lectures on Cowper; Faith, Doubt and Evidence;* etc.

CHEHALIS, a river of Washington, which rises in western Lewis County, flows north to Thurston, then west through Chehalis County into Gray's Harbor. It flows past the city of Chehalis and the Indian reservation of the same name. Its length is about 150 miles; its valley is very fertile, and from 15 to 50 miles wide. It is navigable for about 45 miles for small steamers at high tide.

CHEHALIS, capital of Lewis County, southwestern Washington, on the Chehalis River, and on the Northern Pacific railroad, 60 miles S.S.W. of Tacoma. Its industries are farming and manufacturing. Population 1890, 1,309.

CHEIROLEPIS, a genus of ganoid fishes found as fossils in the Devonian formations.

CHEIROMANCY OR PALMISTRY, a form of divination that professes to read the destiny of an individual by the lineaments of the hand. See PALMISTRY, in these Supplements.

CHEIRON. See CHIRON, Vol. V, p. 675.

CHEIRONECTES OR CHIRONECTES. See OPOSSUM, Vol. XVII, p. 796.

CHEIROPTERA OR CHIROPTERA, bats. See MAMMALIA, Vol. XV, pp. 405–415.

CHE–KEANG, a maritime province of China. See CHINA, Vol. V, p. 636.

CHELIDON, a bird. See MARTIN, Vol. XV, p. 581.

CHELIFER, pseudo scorpions. See ARACHNIDA Vol. II, pp. 282, 283.

CHELIUS, MAXIMILIAN, born at Mannheim, Germany, in 1794; died in 1876. He was a physician and surgeon of distinguished ability. His *Handbook of Surgery* is a standard work, and has been translated into many languages.

CHELMSFORD, FREDERIC THESIGER, BARON, born in London in 1794; died Oct. 5, 1878. He was a midshipman in the navy, but studied law, and was called to the bar in 1818; was made Solicitor-General in 1844, Attorney-General in 1845 and 1852, and Lord Chancellor, with the title of Lord Chelmsford, in 1858 and 1866.

CHELMSFORD, FREDERIC AUGUSTUS THESIGER, second Baron, born May 31, 1827; entered the Rifle Brigade in 1844, became major in the Grenadier Guards in 1855, and served through the Crimean War, the Indian Mutiny, and the Abyssinian campaign of 1868. He was adjutant-general in Bengal (1869–74), and commanded the forces in the Kaffir war of 1878. In the same year he succeeded to the peerage, on the death of his father. In 1879 he was appointed to chief command of the British troops in the Zulu war. At Isandlwhana his advance column, under Colonel Glyn, was surprised by overwhelming numbers and annihilated. This disaster

was retrieved, however, at the battle of Ulundi, July 4, 1879, when the Zulu army, under Cetewayo, was completely defeated. Lord Chelmsford was superseded by the present Lord (then Sir Garnet) Wolseley. He was created a Knight Grand Cross of the Order of the Bath in 1879, promoted to the rank of lieutenant-general in 1882, and in 1884 was made lieutenant of the Tower of London, which post he held until 1889.

CHELONIA, an order of reptiles including the various forms of tortoise and turtle. See TORTOISE, Vol. XXIII, p. 455–460.

CHELSEA, a city of Suffolk County, eastern Massachusetts, three miles N. of Boston, on the Boston and Maine railroad. For its historic description, see Vol. V, p. 458. The manufactories of the city are many and important, the chief being an elastic-rubber factory, chemical-works, factories for making sewing-machines, brassware, linseed-oil, safes, woolen goods, brushes and tools. Population 1895, 31,264.

CHELSEA, a village of Washtenaw County, southeastern Michigan, on the Michigan Central railroad, 15 miles W. of Ann Arbor. It is the best produce market in south Michigan. Population 1895, 2,c 06.

CHELSEA, a village and the capital of Orange County, central eastern Vermont, on the White River, 22 miles S.E. of Montpelier. It is the seat of an academy; it has manufactories of shoes, lumber, and milk products. Population 1890, 1,230.

CHELSEA HOSPITAL, an asylum for old and disabled soldiers of the British army. The foundation-stone was laid by Charles II in 1682, and the building, designed by Wren, and constructed at a cost of $750,000, was opened in 1692. It has accommodation for 600 non-commissioned officers and privates. Gardens, exercise-grounds and a small park are attached to the building, the whole covering about forty acres. The funds for its lands and buildings, and for many years the maintenance of its inmates, were derived chiefly by deductions from the pay of the troops themselves. The staff consists of a governor, lieutenant-governor, secretary, chaplain, physician and adjutant. The cost of the hospital for the year 1894–95 was $133,165, defrayed by a Parliamentary grant. When a soldier enters, his pension ceases, but he is allowed pocket-money (12 to 48 cents per day) according to his rank in the service. All the necessaries are supplied, except that in the case of married men no provision is made for the wife. The hospital is always full, and many are always waiting for admittance as soon as a vacancy occurs.

CHELTENHAM COLLEGE, founded in 1841, in the city of Gloucester, England; incorporated in 1894. There are three departments—the classical, the military and civil, and the junior. In 1896 the number of pupils was 580. The government of the institution is in the hands of a president and twenty members of council. The college is somewhat in the nature of a preparatory school, boys being taken at the age of 10 to 12 years, and thoroughly prepared for the universities.

CHELYUSKIN, CAPE, formerly Northeast Cape, and sometimes called Cape Severo, the most northerly point of Asia, on a peninsula of the same name. It is a low promontory, divided into two parts by a small bay; the latitude of the western part is 77° 36′ 37″ N., that of the eastern 77° 41′ N. It is named after a Russian officer who led an expedition thus far in 1742; it was not revisited until 1878, when Nordenskjöld, in the *Vega*, spent the 19th and 20th of August there.

CHEMICKING PROCESS. See BLEACHING, Vol. III, p. 817.

CHEMICAL ACTION. See CHEMISTRY, in these Supplements.

CHEMICAL AFFINITY. See AFFINITY, CHEMICAL, Vol. I, p. 226; ELECTRICITY, Vol. VIII, p. 92.

CHEMICAL ANALYSIS. See ANALYSIS, Vol. I, pp. 795, 796; also *Chemical Action*, under CHEMISTRY, Vol. V, pp. 474–476.

CHEMICAL FORMULÆ. See MOLECULE, Vol. XVI, pp. 620, 621.

CHEMICAL NOTATION. See CHEMISTRY, Vol. V, pp. 472–474.

CHEMIOTAXIS, a term applied in physiological botany to the attractive power exerted by certain chemical substances upon spermatozoids. Spermatozoids, discharged and swimming in the water, are attracted to the archegonium by these substances secreted by it, and thus fertilization is secured. Thus far this phenomenon has been observed only in certain mosses and ferns, the attractive substance in the former being cane-sugar, in the latter a salt of malic acid. It cannot be doubted that chemiotaxis plays a much larger part in the plant economy, especially in connection with the sexual reproductive processes, than has yet been discovered.

*CHEMISTRY. (For general article on CHEMISTRY, see Vol. V, pp. 459–579.) During the last quarter of a century, chemistry has advanced more rapidly perhaps than during any preceding period of similar length. The number of facts within its domain has increased, and is increasing, so rapidly as to defy the effort of any single man to follow its progress. Not all the facts will be found to be of equal importance, when viewed in proper historical perspective. But the revision of the atomic weights, the discovery of new elements, whether of the rarer sort, like germanium, or of the more plentiful kind, like argon (q.v.), the preparation of new compounds of the highest theoretical as well as of practical interest, and the invention of new ways of manufacturing well-known substances, have all greatly increased our knowledge of the subject-matter of the science. Of even greater value have been the advances in theoretical chemistry. Not many years ago the only general laws were those affecting the composition of chemical compounds, the law that the elements unite in definite proportions by weight to form compounds, and the laws closely connected with it. Now we know much about the laws governing chemical change. One of the most valuable additions to our knowledge in this direction has been the modern development of the theory of solution.

Atomic and Molecular Weights. The atomic weight is the most fundamental property of every chemical element. Every physical and chemical

* Copyright, 1897, by The Werner Company.

property of the element seems to be a function of this. In the practical point of view, its exact determination is of the greatest importance to the analyst, and so touches the commercial aspect of the subject.

The fixing of the proportions in which hydrogen and oxygen combine to form water, in order to ascertain the atomic weights of these elements, has formed the subject of a vast amount of painstaking work. As the result of ten years' investigation, Professor Morley of Cleveland finds the atomic weight of oxygen to be 15.879 where that of hydrogen is 1. This agrees with the average of the determinations of six out of seven recent experimenters, who gave almost equal care to the work, and may be regarded as expressing the closest approach to accuracy attainable by our present means. Since the atomic weights of all the other elements have been measured by comparison with oxygen, this change from the old value (15.96) has involved a recalculation of all other atomic weights. In view of the fact, however, that the measurement of the proportions in which oxygen and hydrogen combine presents great difficulties, and that the results obtained are therefore liable to err, oxygen (with arbitrary atomic weight = 16) has now been almost universally accepted as the basis of all tables of atomic weights; so that when the atomic weight of another element is determined by the use of compounds containing oxygen, the value is affected by errors of the particular determination only, and not by any change in the atomic weight of oxygen itself. Hydrogen has on this scale the atomic weight 1.0076.

The following table shows the most recent values of the atomic weights, on the basis O=16:

Aluminium	27.11	Molybdenum	95.98
Antimony	120.43	Neodymium	140.5
Argon	40.00	Neon	?
Arsenic	75.09	Nickel	58.69
Barium	137.43	Nitrogen	14.04
Bismuth	208.11	Osmium	190.99
Boron	10.95	Oxygen	16.00
Bromine	79.95	Palladium	106.36
Cadmium	111.93	Phosphorus	31.02
Cæsium	132.89	Platinum	194.89
Calcium	40.08	Polonium	?
Carbon	12.01	Potassium	39.11
Cerium	140.2	Praseodymium	143.5
Chlorine	35.45	Radium	?
Chromium	52.14	Rhodium	103.01
Cobalt	58.93	Rubidium	85.43
Columbium	94.00	Ruthenium	101.68
Copper	63.60	Samarium	150.00
Coronium	?	Scandium	44.00
Crypton	?	Selenion	79.00
Didymium	142.30	Silicon	28.40
Erbium	166.30	Silver	107.92
Etherion	?	Sodium	23.05
Fluorine	19.03	Strontium	87.61
Gadolinium	156.10	Sulphur	32.07
Gallium	69.00	Tantalum	182.60
Germanium	72.30	Tellurium	127.00?
Glucinum	9.08	Terbium	160.00
Gold	197.24	Thallium	204.15
Helium	4.00	Thorium	232.63
Hydrogen	1.008	Thulium	170.7
Indium	113.7	Tin	119.05
Iodine	126.85	Titanium	48.15
Iridium	193.12	Tungsten	184.84
Iron	56.02	Uranium	239.59
Lanthanum	138.6	Vanadium	51.38
Lead	206.92	Xenon	?
Lithium	7.03	Ytterbium	173.00
Magnesium	24.29	Yttrium	88.95
Manganese	54.99	Zinc	65.41
Mercury	200.00	Zirconium	90.6
Metargon	?		

The atomic weights of argon and helium at present accepted are 40 and 4 respectively, instead of 20 and 2, as formerly, recent researches tending to show that they are monatomic.

Of equal importance to the determination of atomic weights is the measuring of molecular weights. Until recently the only method available for the purpose consisted in the vaporizing of the substance and weighing a known volume of the vapor; this was only applicable to those substances which were not decomposed by heat and did not possess too high a boiling-point. Other methods have now been discovered which permit the measurement to be made in solution. It has long been known that a solution freezes at a lower temperature and boils at a higher temperature than the pure solvent. It is found that these changes depend on the number of molecules of the substance dissolved in a given quantity of the solvent. Equal volumes of a solvent which show equal depressions of the freezing-point, or equal elevations of the boiling-point, contain equal number of molecules of the dissolved substances, so that the weights of the latter are proportional to the molecular weights. Water, benzene, acetic acid, and other common substances are used as solvents. The only notable exceptions to this rule are acids, bases and salts which are ionized (See ELECTROLYSIS, in these Supplements) in water, and show a larger alteration in the freezing and boiling points, since the ions behave like separate molecules.

Chemical Action. The sharp distinction which was drawn between physics and chemistry long kept the study of these sciences separate. It is gradually being realized, however, that, while "chemistry deals with the relations of atoms to each other, and physics with the properties of molecules and aggregates of molecules," physical conditions have a great influence on chemical changes, and the fundamental laws of the sciences are closely related. One factor in bringing about this *rapprochement* has been the application of the laws of energy to all branches of physical science. All physical changes in matter are accompanied by transformations of energy in some form. Thus a falling body, when changed into a body at rest, becomes heated; its energy of motion is transformed into heat-energy. So when a chemical change takes place in a mixture of, e.g., copper and sulphur, the matter is changed into sulphide of copper, and simultaneously heat is developed. Since this cannot arise out of nothing, it must come by transformation from some other variety of energy.

As the energy resident in a mixture of copper and sulphur cannot be readily identified with any of the familiar kinds of energy, such as electrical or mechanical energy, it is at present regarded as distinct from these, and is named chemical energy.

In every chemical change, as in every physical change, therefore, the transformation of energy is as essential an element in the phenomenon as the change in the matter itself. And in any consideration of the conditions favoring chemical action a study of the energy-change involved will be a prominent feature. In most chemical actions, heat is the form

of energy which arises from, or is transformed into, chemical energy. In special cases, however, the greater part of the energy appears as electricity, as in the battery; and it has recently been shown that mechanical energy, applied by rubbing in a mortar, decomposes certain compounds of silver, gold and other elements into their constituents by producing the necessary chemical energy.

The above reasoning might lead us to the conclusion that the amount of the heat-change involved in any action was a measure of the force which urged the matter concerned from one condition to another. This idea has given birth to the so-called law that every chemical change results in the formation of those substances whose production will evolve the most heat. While this rule is very widely applicable, there are important, and every day more numerous, exceptions to it. In all equilibrium reactions (see Vol. V, p. 475), for example, the chemical change is reversible, and may be driven in either direction, independently of the sign of the heat-change, by altering the concentrations of the interacting substances. Thus in a closed vessel the action,

$$2NaCl + H^2SO^4 = Na^2SO^4 + 2HCl,$$

is only partially accomplished; all four substances co-exist, and the system on the left-hand side is stable in presence of its reaction products, in spite of the fact that heat could be given out by its undergoing change. If the concentration of the HCl is allowed to diminish by allowing the gas to escape, the action will go on to completion from this cause alone. On the other hand, simply injecting more HCl will push the action in the reverse direction of that which the above law would prescribe. The same principle explains the action of carbon monoxide on ferric oxide in the blast-furnace: $Fe^2O^3 + 3CO = 2Fe + 3CO^2$. This action is likewise incomplete in a closed vessel; but if the CO^2 escapes, or increased concentration of the CO is provided for (as is actually done in practice), the action may be carried to completion and all the oxide reduced.

Solution. That chemical changes take place more easily in solution, particularly in water, than under other circumstances, has always been recognized. Till recently, little has been known of the condition of a substance in solution, and so this fact could only be explained by the dogmatic assertion that "substances could only interact when they were in fluid form." An accurate knowledge of the properties of solution, however, has led to a complete explanation of numberless mysterious chemical facts, and has done more for the rationalization of chemistry than any other of its recent advances. Solutions are no longer liquids in which gases, solids or other liquids have been dissolved. They include mixtures of any of these kinds of matter with any other. They have been defined as "homogeneous mixtures which cannot be separated into their constituent parts by mechanical means, the proportion between the parts being continuously variable between certain limits, with a corresponding continuous variation in properties."

The addition of solid solutions to the list has been particularly noteworthy. Thus isomorphous substances form mixed crystals which have many of the properties of solutions. In the ordinary test for iodine the strongly colored blue substance formed has been shown to be a solid solution of iodine in starch, and not a chemical compound. In dyeing, the process is very often, apparently, the passage of the coloring matter out of solution in water into a condition of solid solution in the material of the fabric on account of its greater solubility in the latter; so that the dyed material is not a compound, but a solution. The absorption of hydrogen by heated platinum is a phenomenon of the same order, and it follows the same law in regard to pressure as the solution of a gas in a liquid. Opinions are divided in regard to the similar absorption of hydrogen by palladium, which can take up 900 times its volume of the gas. It is maintained by some that up to 40 volumes the process obeys the laws of solution, and above that a compound is formed. Others consider the whole absorption a case of solution. At all events, the formation of a solid solution of the gas in the metal plays an important part in the operation.

The observation of diffusion (that is, the mechanical transferences of particles through the mass) in solids confirms this view. Thus the penetration of carbon into a bar of iron, in the preparation of steel by cementation, is akin to the diffusion of a salt in solution. It is found that there is a corresponding diffusion of part of the iron into the surrounding charcoal. Plated articles often show a similar interchange in the adjacent parts of the metals. By purposely pressing them together, chemical changes can be produced between dry substances which would otherwise (at the ordinary temperature) only interact in solution in water. Thus when barium sulphate and sodium carbonate were mixed and put under pressure, 20 per cent of the barium became barium carbonate and a corresponding quantity of sodium sulphate was formed:

$$BaSO^4 + Na^2CO^3 = BaCO^3 + Na^2SO^4.$$

On starting with the latter substances the change took place to the extent of 80 per cent in the other direction. This could only have happened in consequence of interdiffusion of the molecules of each substance.

A substance in solution (say, in water) is, in consequence of the presence of the water, compelled to occupy a much larger volume than that which ordinarily belongs to it at the same temperature in the absence of the solvent. The question as to whether the dissolved substance forms a loose combination with the water, and therefore penetrates to every part of it, or whether the phenomenon is a purely physical one, has long been the subject of much discussion. The fact that a substance in dilute solution shows many of the properties of a gas, and that the properties are often independent of the chemical nature of the dissolved body, and depend only on the number of molecules in a given volume of the solution, has led to the belief that no union of any kind with the water has taken place. All the observed facts can be explained on the assumption that the solvent power of the water merely destroys the coherence of the body to be dissolved, and scat-

ters its particles over a much larger space, leaving them in an essentially gaseous condition.

This view explains satisfactorily the phenomena of diffusion. If we place a strong solution of a salt at the bottom of a jar and cover it with pure water, we find that the particles of the salt make their way upward against gravity as if driven by some force, just as the particles of a gas at the bottom of an empty jar would do. The process is slower, on account of the interference of the water, but the similarity between the phenomena is unmistakable. The particles of the gas diffuse by virtue of their energy of motion, and so do those of the salt as fast as the hindering water will permit. This view suggests to us at once the idea that in consequence of this motion the dissolved substance would exhibit a pressure similar to the pressure of a gas, if we could find proper means of measuring it. If a suitable partition (called a semipermeable membrane) is interposed, such that the molecules of the solvent can freely pass through, while those of the salt cannot, the impact of the latter on the membrane establishes a pressure inside the membrane in excess of the pressure on the outside, which is that of the water alone. Such a membrane can be made by filling a porous pot with a solution of potassium ferrocyanide and immersing it in a solution of cupric sulphate. The cupric ferrocyanide precipitated in the material of the pot can be traversed freely by water, but resists the passage of substances in solution. When such a pot, is then filled with a solution and placed in pure water, an excess of pressure shows itself inside, which represents the pressure of the dissolved substance, and is called the osmotic pressure. It can be measured by any convenient gauge.

This osmotic pressure is proportional to the concentration of the solution; that is, it follows a law corresponding to Boyle's law for gases. Furthermore, it is found that equal volumes of solution containing molecular quantities of different dissolved substances, at the same temperature, exhibit the same osmotic pressure. This corresponds to Avogadro's law for gases: that equal volumes of gases at the same temperature and pressure contain equal numbers of molecules.

Measurements show that acids, bases and salts in solution in water exhibit abnormally high pressures, and behave, therefore, in an exceptional manner. This fact, however, far from being a disturbing element, is one of the most striking proofs of the established theory that these substances undergo electrolytic dissociation in solution. (See ELECTROLYSIS, in these Supplements.) Thus sodium chloride, nitric acid, etc., are dissociated in dilute solution with the ions, Na & Cl and H & NO^3, etc., and these particles contribute to the pressure just as if they were independent molecules. The pressure is therefore greater on account of the greater number of molecules present.

The absolute amount of the osmotic pressure is often considerable. A six-per-cent solution of sugar, for example, exercises an osmotic pressure of four atmospheres. Calculations show that a substance exercises the same pressure in solution as it would if it could exist as a gas in the same volume at the same temperature.

These results have explained the phenomena of dialysis observed by Graham about the middle of this century. He found that some bodies, like tannin and gums, which he called colloids, could not pass through membranes of bladder or parchment paper by diffusion, while acids, salts, etc., which he called crytalloids, could do so. He was simply using imperfect semipermeable membranes which permitted the passage of some substances, as well as the solvent, and delayed or prevented the passage of others. The pores of the membrane were apparently large enough to permit the passage of some molecules, while hindering the passage of others. This process is still used in pharmacy, in making substances like dialyzed iron, which is a solution of ferric hydroxide in water which has been freed by dialysis from the salts used in preparing it. The ferric hydroxid is a colloid, and does not pass through the membrane.

Not only do equal numbers of molecules of a substance produce equal osmotic pressure, but also equal depressions in the freezing-point and equal elevations in the boiling-point of the solvent. The use of these facts for the determination of molecular weights has been referred to already. Other chemical properties of solutions are discussed under ELECTROLYSIS; q.v., in these Supplements.

The Atmosphere. Our knowledge of the atmosphere has been enlarged by the discovery of argon (see separate article), and by the recognition of the important *rôle* which dust plays in the air. The importance of this constituent escaped notice until Dr. Aitken showed that the condensation of moisture to fog and rain was due to its presence. By filtering air through cotton wool, or letting the dust settle for a day or two, he prepared samples of air in which excess of moisture produced no condensation, while the introduction of dust caused the instant formation of a fog. The particles of dust seemed to act as nuclei around which the moisture was deposited, and in their absence the air remained supersaturated with water vapor. Not only was smoke capable of producing fog in dust-free, moist air, but even the gases from Bunsen flames exhibited the power in an unusual degree.

Dr. Aitken's experiments show that, other things being equal, the larger the amount of dust in the air, the greater the tendency to form fog and rain. This suggested to him the idea of applying the method in meteorology by the use of a dust-counter. This instrument enabled the observer to count the number of drops of fog which had settled, out of a known volume of moist air, on a known fraction of the whole surface of the vessel. By this means it was possible to determine the number of particles of dust in a cubic inch of various samples of air. In one series of determinations he found the numbers for outside air (raining), 119,000; outside air (fair), 521,000; room, 30,318,000; room, near ceiling, 88,346,000; above a Bunsen flame, 489,000,000; at great altitudes the number was much smaller than at the sea-level. It appears that artificial rain can sometimes be produced in air containing sufficient mois-

ture, by the introduction of large quantities of dust. Experiments in "rain-making" by means of explosives were frequently successful from this cause.

The nitrogen of the air used to be considered an entirely inert constituent, yet the question remained unsettled whether it was not absorbed in some way by plants. It had been a familiar fact that many parts of their structure, particularly the fruit, contained a considerable proportion of nitrogen in combination, but it was also an undoubted fact that they could obtain this constituent from soluble substances in the soil. It is now known, however, that, even when the food-supply to the plant is entirely non-nitrogenous, it can draw its necessary supply of nitrogen from the air. This is accomplished, not by the plant itself, but through the agency of certain organisms which grow at its roots.

Water. As we shall see (see ELECTROLYSIS, in these Supplements), water, far from being a neutral substance, takes an active part in assisting and controlling chemical changes through its dissociative power. In addition to electrolytic dissociation, water frequently produces decomposition by acting chemically on substances dissolved in it. This action is called hydrolysis (or hydrolytic dissociation). Thus when water is added to antimony trichloride, antimony oxychloride is precipitated:

$$SbCl^3 + H^2O = SbOCl + 2HCl.$$

The action is incomplete, and can be reversed by adding hydrochloric acid. It appears that actions of this kind are much more common than was supposed, very many salts being hydrolyzed to a small extent by water. Thus cupric sulphate (anhydrous) is white, but its solution in water is blue. This color was at first attributed to the color of the copper ions, the SO^4 ions being colorless. But if this were the case, dilution, by increasing the dissociation, and therefore the number of ions, should deepen the tint in proportion to the amount of the salt present. As a matter of fact, however, no such change occurs, even when the number of copper ions is doubled; so that probably the blue color is due to the formation of copper hydroxide,

$$CuSO^4 + 2H^2O = Cu(OH)^2 + H^2SO^4,$$

to a small extent. Similarly, the yellow color of a solution of ferric chloride is thought to be due to the presence of ferric hydroxide, since the solution always has an acid reaction:

$$FeCl^3 + 3H^2O = Fe(OH)^3 + 3HCl.$$

In the case of actions furthered by electrolytic dissociation, the fullest exhibition of this power of water is shown in dilute solutions. But it appears that the presence or absence of even traces of moisture may determine the occurrence of many chemical changes. It has been shown that phosphorus, potassium and sodium will not burn in oxygen which has been carefully dried with phosphorus pentoxide, and that the combustion of carbon is greatly retarded; that when dry hydrogen and chlorine are exposed to bright sunlight for two days, more than a quarter of the material remains uncombined, while with the moist gases complete union takes place instantly with explosive violence. Sulphur trioxide refuses to combine with calcium or copper oxides under the same circumstances. The same is true of dry ammonia and hydrochloric acid. Conversely, perfectly dry ammonium chloride gives normal values for vapor density, while the ordinary salt is completely dissociated into ammonia and hydrochloric acid. The most curious fact of the series is, that the same salt also fails to act on quicklime, although, under ordinary circumstances, ammonia, calcium chloride and water are formed:

$$CaO + 2NH^4Cl = CaCl^2 + H^2O + 2NH^3.$$

Here the slightest interaction would have produced the moisture apparently indispensable to the occurrence of the change. In all these cases, on the introduction of a little moisture the chemical actions took their usual course.

New Elements. The discovery of a new element, like that of a new member of the solar system, is always a matter of great interest, and recent years have seen at least eight such discoveries. Just as the finding of Neptune was an occurrence of unusual significance to the astronomer on account of the fact that its existence and position had been foretold, so the discovery of no less than three of these elements has been a matter of special significance to the chemist, inasmuch as their properties had been minutely described several years in advance by Mendelejeff. An examination of the table representing the periodic system (Vol. V, p. 543) will show that there were a number of vacant places which none of the known elements could fill. In 1872 Mendelejeff gave a description of the characteristics which three of the missing members of the series would exhibit if they should be discovered. In 1875 Boisbandran separated gallium from a variety of zinc blende, and found that its atomic weight and properties were those of the hypothetical element, eka-aluminium. In 1879 Nilson and Cleve found a new element in euxenite and gadolinite, which they named scandium. Its properties showed it to be Mendelejeff's ekaboron, and finally, in 1886, Winker analyzed a new mineral, argyrodite, and found in it the third of the series, germanium. None of these elements is sufficiently plentiful to be of commercial value.

It has been known for more than a century that the mineral cerite contained a number of different elements. The oxides of these elements, the so-called cerite earths, proved to be very difficult to separate, however. The elements cerium and lanthanum were the first to be obtained pure. The other constituent, didymium, at first regarded as a single element, has since (1885) been separated by V. Welsbach into two, neodymium and praseodymium. These elements are of practical interest, since their oxides are used in making the mantle of the Welsbach lamp. They give out a very pure, white light when raised to a high temperature.

The new elements, or perhaps mixtures of new elements, argon and helium, form the latest additions to the list. The first is found in the air, and forms one per cent of its volume; the second has been extracted from cleveite and other minerals. (See ARGON and HELIUM, in these Supplements.)

The isolation of fluorine has attracted more attention, perhaps, than any of the above discoveries. It occurs plentifully in nature, in various

forms of combination, and especially as fluorspar (CaF^2). But although many of its compounds were familiar bodies, the element itself had never been obtained in the free state, in spite of innumerable efforts to prepare it. The cause of the difficulty was known to lie in its extreme chemical activity, by virtue of which the moment a trace of it was formed it interacted with the substance of the vessel in which its preparation had been attempted, or with the ever-present moisture, and so passed into a new form of chemical combination. By combining three ideas,—the use of a vessel of material very difficult of attack, a low temperature and consequent relatively small chemical activity of the element, and the absence of moisture,—Moissan (1876) succeeded in preparing considerable quantities with great ease.

When an electric current is passed through aqueous hydrochloric acid, the constituents, hydrogen and chlorine, are liberated at the negative and positive poles respectively. When ordinary hydrofluoric acid is treat similarly, hydrogen and oxygen are the only products. The latter is clearly formed on account of the action of fluorine on water:

$$2F^2 + 2H^2O = 2H^2F^2 + O^2,$$

whereby the hydrofluoric acid is re-formed. Even chlorine acts on water in the same way in sunlight. By taking perfectly anhydrous hydrofluoric acid containing 25 per cent of acid potassium fluoride (KHF^2), Moissan secured a liquid which was decomposed by the current, and yet contained no water. The potassium fluoride broke up into fluorine and potassium. The former was evolved at the positive pole, the latter acted on the hydrofluoric acid, producing potassium fluoride again, and hydrogen, which appeared at the negative pole.

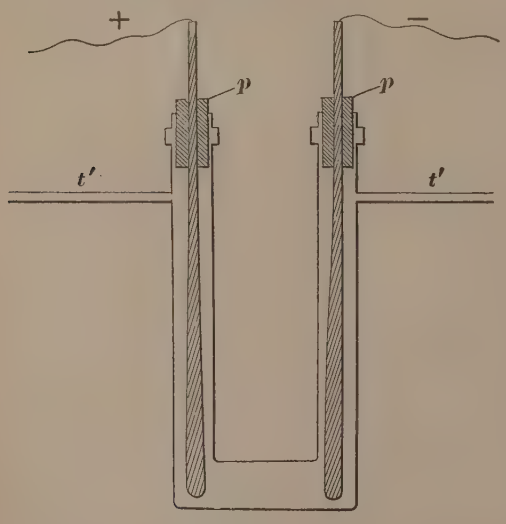


FIG. A.

The apparatus consisted of a U tube made of a platinum-iridium alloy. (See Fig. A.) This material was found to be much less attacked than platinum alone. To avoid the loss of hydrofluoric acid by evaporation, which is rapid at the ordinary temperature, as it boils below 20° C., and to diminish the activity of the fluorine, the tube was surrounded by a glass vessel in which methyl chloride boiled under reduced pressure. The boiling-point of this liquid is −23° C., and by drawing air through the apparatus by means of a pump, a temperature of −40° to −50° C. was maintained. The tube was provided with plugs (p) of fluorite, through which the platinum-iridium terminal passed, and with side-tubes (t and t') for the exit of the fluorine and hydrogen respectively. Observation of the fluorine gas arising at the positive pole showed it to be similar in color to chlorine. It had an odor like chlorine monoxid. It displaced chlorine in sodium chloride just as chlorine displaces iodine in potassium iodide. It united directly with many elements. In contact with hydrogen, explosive union took place even in the dark. Iodine, sulphur, phosphorus, and even crystalline silicon and boron, took fire spontaneously in uniting with it. All metals were converted into fluorides more or less readily. All forms of carbon, excepting diamond, gave CF^4 on warming. Very startling was the action of a few drops of water on fluorine in a platinum tube. So much ozone was formed that the tube seemed to be filled with an indigo-blue gas:

$$3F^2 + 3H^2O = 6HF + O^3.$$

The blue colors disappeared after a few minutes, on account of the decomposition of the ozone. In connection with this new mode of obtaining ozone, it may be mentioned that traces of it have been proved to be formed during the heating of potassium chlorate with manganese dioxide for the purpose of making oxygen. This appears to be a particular case of the remarkable fact that it is formed when oxygen is passed over manganese dioxide, lead dioxide and other oxides at 400° C. These and other experiments have shown that it is not so readily decomposed by heat as had formerly been thought. The gas, supposed to be ozone, which is formed during the slow oxidation of phosphorus has been shown to possess some properties which do not bear out this supposition. It is now thought to be atomic oxygen.

New Compounds. Of the many new substances, or substances which have recently been rendered accessible in a pure condition, a few may be briefly mentioned.

Hydrogen peroxide (H^2O^2) was for a long time regarded as an oxidation product of water ($H^2O + O = H^2O^2$). It is now held to be a reduction product of free oxygen. It is never formed from nascent oxygen and water, while nascent hydrogen has been frequently found to act upon oxygen and produce it. Thus the presence of hydrogen peroxide, in dilute sulphuric acid undergoing electrolysis, has been found to be due to the action of the electrolytic hydrogen on dissolved oxygen. Renewed interest has been attracted to the subject by the fact that the compound can now be prepared perfectly pure and free from water, so that our study of it is not confined to more or less dilute solutions. It is a very unstable body, but if the solution is freed from all traces of alkaline matter, compounds of heavy metals and solid particles, it can be concentrated on the water-bath to a 65-per-cent solution without great loss. The loss which takes place is partly due to evaporation and partly to decomposition into water and

oxygen: $2H^2O^2 = 2H^2O + O^2$. When the concentrated solution is distilled under diminished pressure, the water passes off first, and the last fraction contains 90 per cent of the compound. By repeating the process, perfectly pure hydrogen peroxide is obtained. It is a colorless liquid which can be kept safely in vessels whose surface has been covered with paraffin. Small particles of solid matter, rough surfaces, or the production of a scratch on the bottom of the vessel in which it is held, lead to rapid decomposition in the sense of the above equation. The assumed molecular weight (H^2O^2) has been shown to be correct.

Hydroxylamine (NH^2OH), a base-like ammonia, is obtained as hydrochloride by reducing nitric acid with tin and hydrochloric acid. Till recently, it was only known in the form of salts and in solution. By fractional distillation of the solution in methyl alcohol under diminished pressure, it has been obtained as a hygroscopic crystalline solid, which melts at 33° C., and decomposes explosively at about 100° C.

Hydrazine (N^2H^4) is an extremely interesting and very active body, related to ammonia. It is prepared from triazoacetic ether, and can be obtained by reduction of a compound nitric oxid and potassium sulphite according to the equations:

$KSO^3.NH.NO + 4H = KSO^3.NH.NH^2 + H^2O.$

$KSO^3.MH.MH^2 + KOH = K^2SO^4 + N^2H^4.$

It forms salts with acids, and when set free by bases, forms a hydrate with water ($N^2H^4.H^2O$), from which it is obtained by the action of barium oxide, and can be purified by fractionation *in vacuo*. It is a white solid, melting at −1° C.

Still another compound of nitrogen and hydrogen, hydrazoic acid (N^3H), has been prepared. It is formed by conducting nitrous oxide over Sodamid ($NaNH^2 + N^2O = N^3Na + H^2O$). The product is the sodium salt of the acid, which may be set free with sulphuric acid. The acid is a colorless mobile liquid, of frightfully explosive properties. Less than one grain exploded on being introduced into the vacuum of a barometer, and pulverized the apparatus so completely that only minute particles of it could be found, distributed in every part of the room.

The gas, nitrous anhydride (N^2O^3), has now been shown to be a mixture of NO^2 & NO in molecular proportions. The anhydrid exists only as an indigo-blue liquid at −21° C. Above this temperature it undergoes partial dissociation, even in the liquid state, and when completely vaporized it is entirely broken up into the above two constituents. The gaseous mixture of the composition N^2O^3 is a substance of great commercial importance, as on its power of combining with sulphur dioxide, water and oxygen depends the chemical reaction used in the manufacture of sulphuric acid; so that the above discovery involves a change in our view in regard to the reactions which take place in the lead chamber. The chief changes which take place are:

First, the union of NO and NO^2 with SO^2 and O^2 and H^2O to form nitrosyl-sulphuric acid (chamber crystals):

$$(1)\ 2SO^2 + NO + NO^2 + H^2O + O^2 = 2SO^2\begin{matrix}NO^2\\OH\end{matrix}$$

And second, the action of water on the product, producing sulphuric acid and NO and NO^2 again:

$$(2)\ 2SO^2\begin{matrix}NO^2\\OH\end{matrix} + H^2O = 2H^2SO^4 + NO^2 + NO.$$

The latter then repeat the first operation with fresh quantities of SO^2, H^2O and O^2.

Among the compounds with metals, the carbonyl derivatives have been the most interesting. It had long been known that potassium united with carbon monoxide to form a black explosive substance of the composition $(KCO)^x$, in which the x was probably $=6$. It has recently been found that nickel in a finely divided condition unites directly with CO at 100° C. to form $Ni(CO)^4$. Nickel carbonyl is a colorless liquid which boils at 43° C., and freezes to a mass of needle-shaped crystals at −25° C. Cobalt, which resembles nickel very closely in most respects, does not give any corresponding compound, so that the removal of nickel by means of a stream of carbon monoxide makes a welcome addition to the few known means of separating the elements. The substance decomposes at 180° C. into nickel and carbon monoxide again. A large plant has been erected at Birmingham, England, with a capacity of one and a half tons per week, for preparing pure nickel from nickel matte. The process depends on the removal of the nickel as nickel carbonyl, the decomposition of the latter at a higher temperature, and the re-employment of the carbon monoxide for the extraction of a fresh quantity of the metal. Injected subcutaneously, it is a violent poison, and the breathing of air containing one-half per cent of the vapor is dangerous. The symptoms are the same as those of carbon monoxide poisoning and the spectroscope shows the presence of the same compound with the hæmoglobine in the blood.

Carbon monoxide also forms several compounds with iron of the formulæ $Fe(CO)^4$, $Fe(CO)^5$ and $Fe(CO)^7$, but they have not yet been fully investigated.

Chemistry at the Temperature of the Electric Furnace. Until recently, the highest temperature attainable for commercial or scientific chemical work has been about 2000° C. Isolated attempts have not been wanting to secure higher temperatures by means of the electric arc, but M. Moissan has been the first to devise apparatus for making higher temperatures easy of application. M. Moissan uses an electric furnace made of quicklime or pure limestone. The lower block is hollowed out for the reception of a small crucible, and is provided with grooves for the insertion of the carbon terminals. The upper block is not so thick, and serves simply to cover the hollow in the lower one. The whole apparatus is from 7 to 9 inches long by 6 inches wide and 5 to 6 inches high. The fundamental points are, that the substance of the furnace is so poor a conductor that the outside can be touched with the hand without discomfort, and the heat is thus concentrated as much as possible; that the current does not pass through the substance, but across its surface, so that the full action of the heat is obtained without any electrolytic effect; and that the carbon poles can be moved so as to regulate the length of the arc, with the object of maintaining the same current-strength even when vapors with con-

siderable conductivity are formed, and so maintaining a constant temperature. To prevent chemical action between the lime of the furnace and the carbon of the crucible, a layer of pure magnesia is used to line the interior. For some purposes, hollow carbon poles were used to permit the introduction of various gases during the experiments. In examining the vapors present, a small copper vessel through which a stream of water flowed was lowered into the interior. A part of the vapor condensed on its surface. The currents ordinarily used varied from 35 to 40 amperes and 55 volts, to 450 amperes and 75 volts. The temperature was estimated to be at least 3500° C.

The physical effects of exposure to such temperatures were remarkable. With the less powerful current quicklime was transformed into shining white crystals of CaO; with a stronger current, fusion took place; with a current of 1,200 amperes and 110 volts, 100 grams (3½ ounces) of quicklime were melted and converted into vapor in five minutes. Pure sand (silica) melted and boiled with a current of 360 amperes and 70 volts. The condensing vapor took the form of small drops. Even carbon was converted into vapor. A tube made of carbon became filled with a network of fine crystals of graphite. The chemical effects were still more remarkable. They took the form chiefly of reduction of hitherto irreducible oxides, and the formation of compounds of the metal with carbon (carbides), while reductions which are difficult in a gas-furnace became mere child's play. Of the latter sort was the production of manganese from the oxides and carbon. The metal evaporated rapidly. Of the former class were the preparation, in large quantities, of the metals chromium, tungsten, molybdenum and titanium.

In nearly every case the first product was a carbide, or at least a specimen of the metal containing much carbon, and renewed heating with some of the oxide of the metal was necessary to effect the removal of the carbon. Metal carbides of definite composition were obtained in several cases (Cr^3C^2, Cr^4C, Mo^2C, Al^4C^3, TiC). The aluminium carbide could only be made by this interaction of alumina and carbon in the form of vapor. It consisted of transparent yellow crystals, which decomposed slowly in contact with water, giving marsh-gas and aluminium hydroxide:

$$Al^4C^3 + 12H^2O = 3CH^4 + 4Al(OH)^3.$$

In several cases a practical application has been found for the newly discovered substances. Thus calcium carbide (CaC^2) is now manufactured for the preparation of acetylene for illuminating purposes. The carbide is made by heating quicklime (120 parts) and coke (20 parts) in an electric furnace (350 amperes and 70 volts) for 15 to 20 minutes. It is a white homogeneous substance of crystalline structure. It reacts violently with water, giving torrents of acetylene gas:

$$CaC^2 + 2H^2O = Ca(OH)^2 + C^2H^2.$$

Carborundum is another result of these investigations. It is made by heating silica (sand) with carbon, and has the composition SiC. Its value is due to the fact that it is almost as hard as the diamond, and can be advantageously used for many purposes as a substitute for the latter, on account of its cheapness. When free from iron it forms colorless crystals which scratch the ruby; it is not affected by oxygen at 1000° C., or by potassium nitrate or chlorate at their melting-points, or by any acids.

Carbide of boron (B^6C) is prepared by heating amorphous boron with carbon and a large quantity of copper. The latter acts as a solvent for the carbide, which is obtained in shining black crystals when the copper is dissolved in nitric acid after the mass has cooled. It is of interest because it is harder than carborundum, and can be used for polishing diamonds, although slightly inferior to the latter in hardness.

The original experiments with the electric furnace were undertaken in connection with efforts to prepare artificial diamonds. These were partially successful. The best results were obtained by dissolving carbon in molten iron or silver at 2000° to 3000°, and then immersing the crucible in cold water. This produced a solidified coating around the still molten exterior, and the contraction accompanying the solidification subjected the solution in the interior to great pressure. By allowing the mass to continue cooling slowly in the air and then dissolving the metal away with acids, various forms of graphite and diamond were obtained. Without the preliminary sudden cooling and consequent pressure, only graphite was formed. The diamonds were of two kinds. Some were black, and resembled the natural "carbonados." Other fragments were transparent, and had all the properties of natural diamonds. They were very small, however.

The results of electric-furnace work are of great importance for several reasons. Besides those already mentioned, the carrying out of actions impossible at lower temperatures, and the production of new compounds, especially carbides, many of which will doubtless be of commercial value, they give us some grounds for speculation in regard to other chemical changes which may go on in the stars, and which may have taken place during the cooling of the earth from a nebulous condition. They recall Daubrée's suggestion that all the carbon of the present organic world may have originally been in combination with metals, and that possibly much of the interior matter of the earth may be carbide of iron and other similar compounds. It has been thought that some of our natural gas, consisting largely of methane, or marsh-gas, may come from the action of water on carbides (see ALUMINIUM CARBIDE, above.)

Chemistry at Low Temperatures. The liquefaction of the various gases has always been a problem of interest to chemists. Faraday succeeded, by applying cold or pressure, in obtaining such gases as chlorine, sulphur dioxide and ammonia in liquid form, but he failed to effect this change with hydrogen, oxygen, nitrogen, marsh-gas, nitric oxide, carbon monoxide, etc., and these were therefore known as the permanent gases. Later experimenters have succeeded in liquefying all of these, and have even obtained the last four in solid form.

The earlier (1877) experiments of Cailletet and Pictet, in which the highly compressed permanent gases were cooled by boiling liquid carbon dioxide, showed that on releasing the pressure the temperature fell still farther, and a mist of liquid particles was visible for a few seconds in the inner tube of the apparatus. More recently, large quantities of these gases in the liquid condition have been prepared. By using the evaporation of liquid ethylene (−120°), and a pressure of about 50 atmospheres, liquid oxygen can be made. Liquid oxygen, in turn, evaporating *in vacuo*, gives a temperature of −211°, and can therefore be used as a cooling agent for other experiments. Thus when an open test-tube is surrounded by a jacket in which liquid oxygen is boiling under reduced pressure, the air in the tube liquefies, and a large quantity of the liquid air can be collected in a very short time. Oxygen boils at −180° and carbon monoxide at −190°, in an open vessel, at atmospheric pressure. Hydrogen, which was the most difficult of the series to liquefy, boils at −243.8°. This work was rendered much easier by the invention of vessels of glass with double walls in which the air had been withdrawn from between, so that a kind of "vacuum jacket" was formed. In such vessels a pint of liquid oxygen can be kept without external cooling for considerable time, the only loss being due to the gentle boiling of the liquid.

A few experiments on the effects of low temperatures on ordinary chemical changes have led to interesting results. Photographic action seems to be impeded, but not prevented. On the other hand, many substances which react violently at ordinary temperatures become entirely passive on cooling. Thus metallic sodium has no apparent action on aqueous alcohol at −80°. It may be added that it has been found that while moist chlorine attacks metals with extreme vigor, dry chlorine has no effect on them, so that liquid chlorine is now sold compressed in iron cylinders, and is much used in chemical industries.

Organic Chemistry. [The old distinction that organic chemistry was concerned only with compounds which were the result of vital forces has long been abandoned. The change of view began with Wöhler's artificial production of urea in 1828. For a general discussion of the matter, see CHEMISTRY, Vol. V, pp. 544 et seq. The progress of this branch of chemistry since that article was written is recounted below.] Organic chemistry, or more properly the chemistry of the compounds of carbon, for many of the products can be obtained quite independently of physiological processes, has accumulated more material than all the other departments of chemistry together. Yet much of this is of so technical a nature that we must here confine ourselves to a short account of a few only of the chief advances.

Many familiar organic bodies can now be prepared artificially. Indigo, for example, has attracted much attention on account of the large quantities of the natural products which are used in dyeing. No satisfactory substitute has been found for it, and hence a method of preparing it from cheap materials would be very welcome. Its constitution is now known, and several methods of synthesizing it have been discovered, but the artificial product still costs as much as, or more than, the natural one. Alizarin, another valuable dye, has been known for ages, and was obtained from the madder-root. In this case the efforts to prepare it cheaply have been more successful, and it is made in large quantities from anthracene, a constituent of coal-tar.

The investigation of the vegetable alkaloids, such as conine, nicotine, atropine, cocaine, quinine, morphine, narcotine, strychnine and brucine, has been followed strenuously. In a few cases their artificial preparation has been achieved. Conin, the poisonous principal of hemlock, was the first of the class (1886), and piperin, which occurs in pepper, and trigonelin, which is found in fenugreek, followed closely. In other cases their decomposition into known substances has paved the way for synthetic work. On the other hand, some artificial substances which have similar physiological action have been adopted in medicine, and have taken the place of the alkaloids to some extent. Thus we have as antipyretics, acetanilide (antifebrine), phenyl dimethyl pyrozolone (antipyrine) and phenacetine, which are manufactured in enormous quantities, and produce a greater lowering of temperature than quinin.

In no direction has chemistry made greater progress than in the study of the sugars. Not only have many new members of the group been discovered, but several sugars which occur in nature have even been prepared artificially. Formerly the simplest substances known as sugar had the formula $C^6H^{12}O^6$ (grape sugar and levulose), and the others, such as cane sugar ($C^{12}H^{22}O^{11}$), contained simple multiples of this number of carbon atoms. Our view has now been widened, so that all bodies having the atomic groupings—CHOH.CO—are found to share the properties of the sugars, and members of the series containing from 2 to 9 carbon atoms have been prepared. Bodies, like cane sugar, derived by doubling up the simpler formulæ are classified as saccharids and polysaccharids (e.g., starch $(C^6H^{10}O^5)^x$). The first sugar to be synthesized was α-acrose. It was a constituent of a mixture of sweet substances formed by boiling an aqueous solution of formaldehyde with milk of lime $6CH^2O = C^6H^{12}O^6$. A better yield of it was obtained by oxidizing glycerin ($C^3H^8O^3$) with bromin. The product from the first step was called glycerose, and contained two bodies having the formula $C^3H^6O^3$. When it was boiled with lime, α-acrose was formed:

$$C^3H^6O^3 + C^3H^6O^3 = C^6H^{12}O^6.$$

From α-acrose, grape sugar (dextrose) $(CH^2OH.(CHOH)^4.COH)$, levulose (fruit sugar) $CH^2OH.(CHOH)^3.CO.CH^2OH$, were prepared.

In this connection reference may be made to saccharin. This substance is a coal-tar derivative, and is chemically entirely unrelated to the sugars. It resembles them solely in its quality of sweetness. It is orthobenzoylphonimide $(C^6H^4\begin{smallmatrix}/SO^2\backslash\\\backslash CO/\end{smallmatrix}NH)$. It is 500 times as sweet as cane sugar, and is manufactured in considerable quantities.

Among the long-known substances whose constitution is now determined are several derivatives of

carbon monoxide in which the carbon atom is bivalent. Hydrocyanic acid (prussic acid) is H—N=C. Fulminic acid has the formula H—O—N=C. Its mercury salt ($Hg(ONC)^2$) is known as fulminating-mercury, and is largely used in making percussion-caps. ALEX. SMITH.

See PHYSIOLOGICAL CHEMISTRY, in these Supplements.

INDEX.

Acetylene 774
Alkaloids 775
Atomic weights 767–768
Calcium carbide 774
Carborundum 774
Carbid of borone 774
Dialysis 770
Diamonds 774
Dust, atmospheric 770–771
Electric furnace 773–774
Elements, new 771–772
Fluorine 771–772
Furnace, electric 773–774
Hydrazine 773
Hydrazoic acid 773
Hydrogen peroxide 772–773
Hydroxylamine 773
Liquefaction of permanent gases 774–775
Liquid oxygen 775
Nickel carbonyl 773
Nitrous anhydride 773
Osmosis 770
Osmotic pressure 770
Ozone 772
Saccharid 775
Solutions 769–771
Sugar 775
Sulphuric acid manufacture 773
Water, chemical effects of 771

CHEMMIS, an ancient Egyptian town. See EKHMIN, Vol. VII, p. 794.

CHEMOSH, a Moabite god. See MOAB, Vol. XVI, p. 534.

CHEMULPO OR IN-CHÖN, a town on the west coast of Corea, at the mouth of the Han River, 25 miles by road S.W. of the capital, Söul. It is one of the three treaty ports opened in 1883 to foreign commerce, the volume of which has since steadily advanced in spite of the drawbacks resulting from the great difference between high and low water here (33 feet) and the want of wharves. Since 1885 it has had telegraph connection with China. A line, partly constructed, will connect with the Russian telegraph system in Siberia. A cable connects Chemulpo with Japan. The Japanese army landed here its troops for the invasion of China in the war of 1894.

CHEMUNG GROUP. See GEOLOGY, Vol. X, p. 345.

CHEMUNG RIVER, a river of New York which is formed by the conjunction of the Tioga and Conhocton rivers, in Steuben County; flows in a southeasterly direction through Chemung County into Pennsylvania, and then joins the Susquehanna. It is about forty miles long.

CHENANGO RIVER, a river which rises in Oneida County, central New York; flows southwest and enters the Susquehanna at Binghamton.

CHENEY, a town of Spokane County, central eastern Washington, on the Northern Pacific railroad, 15 miles S.W. of Spokane. It is situated in a lumbering district, and in the handling of this the town is mostly occupied. Population 1890, 1,647.

CHENEY, CHARLES EDWARD, Episcopal clergyman, was born in Canandaigua, New York, Feb. 12, 1836; graduated at Hobart College in 1857. In 1860 he became rector of Christ Church Mission, Chicago. While there he became involved in a serious dispute with the bishop of his diocese (Bishop Whitehouse), partly in consequence of his refusal to use the word *regenerate* in the service of the baptismal rite. His trial attracted wide attention, Melville W. Fuller (afterward chief justice of the United States) being his counsel, and resulted in his deposition from the priesthood. With Bishop Cummins of Kentucky he organized the Reformed Episcopal Church, of which he was created bishop in 1873.

CHENEY, JOHN VANCE, an American librarian and poet; born at Groveland, New York, Dec. 29, 1848; educated at Temple Hill Academy, Geneseo, New York, and at Burr and Burton Seminary, Manchester, Vermont; studied law, and was admitted to the bar in Massachusetts; began practice in New York City, but ill health compelled him to give up his profession, and he removed to California. In 1887 he was made chief librarian of the San Francisco Free Public Library, where his eight years of service gave him such repute that he was chosen, in 1894, to fill the place made vacant by the death of Dr. William F. Poole, as chief librarian of the Newberry Library in Chicago. He wrote verse and literary essays from boyhood. Among his published writings are *Thistledrift* (1887), *Woodblooms* (1888), *Queen Helen* (1895), all poems, besides two volumes of essays—*The Golden Guess* (1892) and *That Dome in Air* (1895). He edited *Wood Notes Wild* (1892), a series of unique papers on bird-music, written by his father, Simeon Pease Cheney.

CHENOA, town of McLean County, northwestern Illinois, on the Chicago and Alton and the Toledo, Peoria and Western railroads, 48 miles E. of Peoria. It has tile-works, canning factories and coal-mines. Agriculture is also an important industry. Population 1890, 1,226.

CHENOPODIACRÆ, a family of dicotyledonous plants, mostly apetalous, and allied to the *Caryophyllaceæ*, or "pink family." They are generally herbaceous and weedy, mostly succulent and "mealy," with panicles of small, greenish flowers and a nut-like fruit. The species are characteristic of desert and alkaline or saline regions. In the Western United States they include most of the so-called "grease-woods." Characteristic genera are *Chenopodium* (goosefoot), *Blitum* (blite), *Beta* (beet), *Spinacia* (spinach), *Atriplex*, *Salicornia* (glasswort) and *Suæda* (sea-blite). The only important economic plant of the family is the beet (*Beta vulgaris*).

CHER, a small river of the department of Loire-Inférieure, western France, a tributary of the Vilaine, about 25 miles in length.

CHERAW, a railroad junction in Chesterfield County, southeastern South Carolina, at the head of navigation on the Pedee River, on the Atlantic Coast Line and the Palmetto railroads. This place

was made a depot of supplies by the Confederates during the late war, but was captured by General Sherman's troops, March 3, 1865. Population 1890, 976.

CHERBULIEZ, Antoine Elisée, a Swiss economist; born in Geneva, July 29, 1797; died at Zurich, March 7, 1869. He came of a family noted for literary talents; was professor of law and political economy at Geneva; later at Paris, where he opposed Proudhon and the socialists; was afterwards professor of political economy at Zurich. He wrote numerous works on political science; among them, *L'Utilitaire* (1830); *De la Démocratie en Suisse* (1843); *Études sur les Causes de la Misère* (1853); and *Précis de la Science Économique* (1862), pronounced by Cossa to be the best treatise on the science in the French language.

CHERBULIEZ, Charles Victor, nephew of Antoine, an eminent French novelist; born at Geneva July 19, 1829; studied at Paris and in the universities of Bonn and Berlin. Dec. 8, 1881, he was elected a member of the French Academy; received the decoration of the Legion of Honor in 1872, and was made an officer of the same in 1892. Besides numerous popular works of fiction, he has published many volumes on literary and art criticism and on politics; among them, *Le Roman d'une Honnête Femme* (1866); *L'Aventure de Ladislas Bolski* (1869); *L'Allemagne Politique* (1870); *L'Espagne Politique* (1874); and *L'Art et la Nature* (1892).

CHERIMOYER, a native name applied to the fruit of *Anona cherimolia*, one of the much-prized "custard apples" of tropical America, but cultivated in all tropical regions. Like the rest of the group, the large, roundish fruit has an abundant soft pulp (in this case white), in which are imbedded the seeds, as in the "papaw," the northern representative of the group. Also written "chirimoya."

CHERNIGOFF, a Russian city and government. See Tchernigoff, Vol. XXIII, p. 96.

CHEROKEE, a town and the capital of Cherokee County, northwestern Iowa, situated on the Illinois Central railroad and the Little Sioux River. It is furnished with electric lights and good water-works, and has the Cherokee Magnetic Mineral Springs, which produce a solution of sulpho-carbonated chalybeate. Population 1890, 3,441.

CHEROKEE, a town of Crawford County, southeastern Kansas, on the Kansas City, Fort Scott and Memphis, the Kansas City, Pittsburg and Gulf and the Missouri Pacific railroads, 136 miles S. of Kansas City. It has several factories, mills, machine-shops and coal-shafts. Population 1895, 1,314.

CHERRY-LAUREL, a shrub. See Laurel, Vol. XIV, p. 348.

CHERRYVALE, city of Montgomery County, southeastern Kansas, on the Kansas City, Fort Scott and Memphis, the Atchison, Topeka and Santa Fé and the St. Louis and San Francisco railroads, 156 miles S.S.W. of Kansas City. The city is lighted and heated by natural gas. The surrounding country is agricultural. Population 1895, 2,386.

CHERRY VALLEY, a village in Otsego County, eastern central New York, the terminus of a branch of the Delaware and Hudson railroad. On Oct. 11, 1778, nearly all the inhabitants were massacred by Indians and Tories, and the buildings were burned. Population 1890, 685.

CHERSON, a Russian city and government. See Kherson, Vol. XIV, pp. 61, 62.

CHERT, a variety of flint. See Flint, Vol. IX, p. 325; Geology, Vol. X, p. 349.

CHERVIL, a name applied to several sweet aromatic species of *Umbelliferæ*, especially of the genus *Anthriscus*, several of which are cultivated as potherbs.

CHESANING, a village of Saginaw County, southeastern Michigan, on the Shiawassee River and on the Michigan Central railroad, 20 miles S. of Saginaw. It has manufactories of the products of lumber and farming, and it derives abundant water-power from the river. Population 1894, 1,091.

CHESAPEAKE BAY, in Maryland and Virginia, and dividing the former state into two parts. It is the largest inlet on the Atlantic coast; separated from the ocean by the peninsula on which are Delaware and ports of the above-named states. It extends northward from Cape Charles for 170 miles, and receives the waters of the Susquehanna, Potomac, Rappahannock, York, James and numerous smaller rivers.

CHESBROUGH, Ellis Sylvester, civil engineer; born in Baltimore, July 6, 1813; died in Chicago, Aug. 19, 1886. At the age of 13 he was obliged to leave school and became helper to an engineering party surveying a route for the Baltimore and Ohio railroad; in 1831 he began railroad-building; in 1846 became chief engineer of the Boston water-works; in 1855 became engineer of the Chicago Board of Sewerage Commissioners, and in that position planned the sewerage system and the river tunnels of Chicago. He was a corresponding member of the American Institute of Architects, and in 1878 president of the American Society of Civil Engineers.

CHESNELONG, Pierre Charles, a French statesman; born at Orthez, France, April 14, 1820; acquired a large fortune in the rearing of hogs; was elected a member of the Corps Législatif (1865) as an ultra-Imperialist; re-elected in 1869; elected to the National Assembly (1872); helped the fall from power of President Thiers; was one of the founders of the Catholic workingmen's societies; visited the Count de Chambord (the Bourbon pretender) in 1875, in Austria, with the committee of nine appointed to offer him the crown of France; the Count refused to accept the conditions, and the plan of restoration failed. He was elected permanent Senator (1876); sustained the De Broglie cabinet of 1877 that ended by President MacMahon's resignation, and after that remained in the small antirepublican senatorial minority.

CHESNEY, Francis Rawdon, a British explorer; born at Annalong, County Down, Ireland, in 1789; died at Mourne, Ireland, Jan. 30, 1872. In 1829 he inspected and proved practicable the route of the Suez canal; in 1831 he explored a route from Europe by way of the Red Sea to India; in 1836 descended the Euphrates in a steamer; was commander of artillery at Hongkong from 1843 to

1847. In 1850 he published his great work, *The Expedition for the Survey of the Euphrates and Tigris*, in four volumes; in 1868, *Narrative of the Euphrates Expedition;* and *The Russo-Turkish Campaigns of 1828–29.*

CHESNEY, Sir George Tomkyns, English general; born in 1830; educated at Woolwich; joined the Bengal Engineers in 1848; twice wounded at the siege of Delhi. His brochure, *The Battle of Dorking* (1871), created a marked sensation. In 1887 he became a member of the council of the governor-general of India; and in 1892 M. P. for Oxford. Died in London, March 31, 1895.

CHESS—Change of Style in Modern Play. Since the close of the meteoric career of Morphy in the chess world, it has been a subject of remark that no other player has shown so much superiority over his competitors and routed his adversaries so completely as did the young American champion. Within a few years it has come to be conceded that the reason for less pyrotechnic displays of chess-play lay rather in the fact that players of the first grade are now better equipped in matters of analysis than was the case in Morphy's time. It was claimed for Morphy that he could give odds to any living player. This may not have been true, but it certainly appeared that few of his opponents were worthy of meeting him on even terms. To-day no player is accounted as of the first power if he could not win from the most experienced at the smallest odds. The claim was even made by Steinitz that the time had arrived when no accurate player could afford to sacrifice a gambit-pawn in the opening. This claim was disputed by Tschigorin, and disproved by a subsequent match between the players, as well as by the results of numerous tournament games since that time. Nevertheless, coming from a player who is conceded to be inferior to none in analysis, and who held the world's championship for a longer period than any other champion, it affords a most valuable criterion of the result of modern analysis. The results of tournaments and match games also show a largely increased number of drawn games, indicating that strategy in chess is approaching its limit, and that the science is not the matter of exhaustless computation that it is reputed to be.

Certain openings and lines of play are proverbially regarded among chess-players as likely to produce draws, because their peculiarities have been largely exhausted by the analysts. At the St. Petersburg tournament in the winter of 1895–96, it is thought that the four players participating were the strongest ever brought together, and the result did not indicate the ability of any one of them to dispatch any of the others in the style of Morphy. Lasker, who took first prize, and who has never been beaten in a set match, is remarked upon as following no school of play, but relying upon the trading off of the more powerful pieces on the board, and the securing of a pawn position which will win in the ending. He appears to make the closest calculations as to end-game positions, and is unsurpassed in that part of chess strategy.

Steinitz, the recognized world's champion until he lost a match to Lasker, stood second in the St. Petersburg tournament. His style of play consists in the endeavor to force his opponent to take up an unsound position in the middle game, and he has often taken questionable positions himself in the endeavor to induce his opponent to leave some safe and sound arrangement of pieces.

Pillsbury, third-prize winner at St. Petersburg, and winner of the international tournament at Hastings, England, in 1895, is regarded by many as presenting a nearer approach to Morphy in his play than any other of the great living players. He wins by far-sighted combinations in the middle game, outgeneraling his opponents by superior combinations of force at the strategic points.

Tschigorin, fourth-prize winner at St. Petersburg, is pre-eminently a gambit-player. He never shows to such good advantage as when he has the opening move and chooses to sacrifice a pawn for the attack. He has downed all the theoretical defenses that have been presented within recent years to the famous Evans's gambit.

Notwithstanding these differences of style between the chess-masters, it is apparent in the play of all that the surprises which characterized play in Morphy's time are to be found but seldom in the play of modern experts, and that the game is better known now than then, and that if Morphy were to play to-day he would have to master the results of recent analyses before he could conquer the later exponents of the complications of chess. C. H. Cochrane.

CHESS or CHEAT, the popular name of *Bromus secalinus*, a grass common in wheat-fields, bearing some resemblance to oats. Its close association with wheat has given rise to the erroneous belief that it is degraded wheat.

CHEST or THORAX, in anatomy. (See Respiration, Vol. XX, p. 476.) The contents of the chest are the heart, the great arteries and veins, the lungs, the trachea or windpipe, the bronchi or branches of the trachea leading to the lungs, the œsophagus or gullet, and the thoracic duct or general terminus of the lymphatic system of vessels by which the chyle and lymph are discharged into the blood.

CHESTER, a coal-shipping city and the capital of Randolph County, southern Illinois, situated on the Mississippi River, and on the Wabash, Chester and Western railroad, 55 miles S. S. E. of St. Louis. It has a grain-elevator and flour and rolling mills. Population 1890, 2,708.

CHESTER, a port of entry of Lunenburg County, southern Nova Scotia, on a point of land in the Mahone Bay, 34 miles W. of Halifax. It has large fishing-interests. Population 1891, 3,050.

CHESTER, a city of Delaware County, southeastern Pennsylvania, on the Delaware River, about 15 miles below Philadelphia. The town was settled by the Swedes in 1643, and called Upland. It was incorporated in 1866. Ship-building is its chief industry, several thousand men being employed in the shipyards. Population 1880, 14,997; 1890, 20,167. See also Chester, Vol. V, p. 606.

CHESTER, capital of Chester County, northern central South Carolina, on the Seaboard Air Line,

the Southern, the Cheraw and Chester and the Chester and Lenoir railroads, 65 miles N.N.W. of Columbia. It is chiefly a cotton-shipping station. Population 1890, 2,703.

CHESTER, a manufacturing town of Windsor County, southeastern Vermont, on the Central Vermont railroad, 39 miles S.E. of Rutland. It has an academy, and produces leather, furniture, lumber, boots and shoes. Population 1890, 1,787.

CHESTER, Joseph Lemuel, an American genealogist; born in Norwich, Connecticut, April 30, 1821; died in London, England, May 28, 1882. He was a writer for the Philadelphia press, and in 1858 went to England and made researches in the genealogies of the early settlers of New England. Mr. Chester published, with notes, a copy of the Westminster Abbey registers, indexed the London marriage licenses, in itself a monumental work, and collected much valuable family history.

CHESTERFIELD INLET, a gulf penetrating to the westward from the northwest of Hudson Bay, at lat. 63° 30′ N., and long. 90° 40′ W., its extreme dimensions being 250 and 25 miles. Its western end expands into Baker Lake.

CHESTERTOWN, a seaport town and the capital of Kent County, northeastern Maryland, on the west bank of the Chester River and on the Baltimore and Delaware Bay railroad, 30 miles E. of Baltimore. Washington College is here. Population 1890, 2,632.

CHETIMASHES, a lagoon of Louisiana. See Grand Lake, in these Supplements.

CHETOPA, a city of Labette County, southeastern Kansas, on the Missouri, Kansas and Texas and the Missouri Pacific railroads, near the line of Indian Territory, situated on the Neosho River. The city has many mills, where flour and castor-oil are made. There are schools, stockyards, and also a foundry. Population 1895, 2,640.

CHEVALIER, Michel, a French political economist; born in Limoges, Jan. 13, 1806; died in Montpellier, Nov. 28, 1879. He became a follower of St. Simon and Enfantin, and suffered six months' imprisonment for his writings on social questions. In 1828 he edited the *Globe*, and four years later was sent by Thiers to examine the canals and railroads of the United States. In 1838 he became Councilor of State, and in 1845 was elected to the Chamber of Deputies. In 1848 he opposed the socialistic doctrines of Louis Blanc. He was an advocate of free trade, a professor of political economy in the College of France, in 1841 chief engineer of mines, and in 1860 became a Senator and completed the great work of his life, the negotiation of a commercial treaty between France and England. He wrote several books about America, among them *History and Description of the Ways of Communication in the United States.* See also Political Economy, Vol. XIX, p. 395.

CHEVAUX-DE-FRISE. See Fortification, Vol. IX, p. 423.

CHEVERUS, Jean Louis Anne Madeleine Lefebvre de, Roman Catholic prelate and philanthropist; born in Mayenne, France, Jan. 28, 1768. He went to Boston in 1796, having suffered persecution in France, became famed for eloquence, and also for his philanthropy during a yellow fever epidemic. In 1803 he founded the Church of the Holy Cross; in 1810 became the first bishop of Boston, and founded the Ursuline convent at Charlestown. Returning to France on account of ill health, he was consecrated archbishop of Bordeaux in 1826, and cardinal nine years later. He died in Bordeaux, July 19, 1836.

CHEVES, Langdon, an American statesman; born at Rocky River, South Carolina, Sept. 17, 1776; died in Columbia, South Carolina, June 25, 1857. He was a lawyer and became eminent in his profession; served in Congress from 1811 to 1816; was Speaker of the House during one session, and in 1816 became judge of the superior court of South Carolina. While in Congress he voted against rechartering the United States Bank, but in 1819 he was elected its president, holding this position for three years. In 1822 Mr. Cheves became commissioner of claims under the Ghent treaty.

CHEVREUL, Michel Eugène, a French chemist; born at Angers, Aug. 31, 1786. He lectured at the Collége Charlemagne, and was appointed special professor of chemistry in charge of the dyeing department at the Gobelins tapestry factory. In 1826 he took his seat in the Academy of Sciences, and in 1830 became director of the Museum of Natural History. One of his earliest discoveries was that of margarin, olein and stearin in oils and fats. His studies in fatty bodies and his theory of saponification have opened up vast industries. Between the years 1828 and 1864 Chevreul studied colors, publishing important memoirs from time to time. His original and striking investigation of colors, their production and optical effects, has become the standard text-books for artists and designers. He died in Paris, April 9, 1889, nearly 103 years of age.

CHEVRON, in architecture, a molding in the form of a succession of chevrons, otherwise called zigzag-molding. In general, it is characteristic of Norman architecture. In heraldry, is one of the honorable ordinaries, representing the couples or rafters of a house, and supposed to betoken the accomplishment of some memorable work, or the completion of some business of importance. (See Heraldry, Vol. XI, p. 694.) In a uniform, is a band or stripe of braid sewed in an angle on the coat sleeves of non-commissioned officers, the number of stripes indicating the rank of the wearer.

CHEVY CHASE, an early example of English ballad poetry supposed to have been written in the time of Henry VI, or between 1422 and 1461. It purports to describe the battle of Otterbourne, fought August, 1388, but the ballad conflicts with Froissart's circumstantial account, and probably incorporates the chase of the Earl of Douglas among the Cheviot Hills after Earl Percy of Northumberland. The oldest MS. of the ballad is preserved among the Ashmolean MSS., in the Bodleian Library at Oxford, having attached to it the name of Richard Sheale, a ballad singer or reciter of the reigns of Mary and Elizabeth. The ballad, preserved in Percy's *Reliques of Ancient English Poetry* and Scott's *Minstrelsy of the Scottish Border* has always been a favorite. Sir Philip Sidney said it stirred him like the sound of a

trumpet, while the classic Addison devoted two papers in *The Spectator* to a critique on a more modern version of the same artless but heroic metrical story.

CHEWINK, a bird of the family *Fringillidæ*, native of the United States and Canada, allied to the finches. Its color is black and brown, with white and red on wing and tail coverts. It is about seven to nine inches in length. It lives principally in thickets, feeding on worms and insects; spends the winter in the south, returning north in the early spring. It is found in all parts of the United States east of the Missouri River and also on the Pacific Coast.

CHEYENNE, a city and the capital of the state of Wyoming and county seat of Laramie County, located in the southeastern part of the state, on Crow Creek, and on the eastern slope of Laramie Mountain, at an altitude of 6,041 feet above sea-level. It was founded in 1867, and because of its rapid growth has been called the "Magic City of the Plains." It is an important railroad center, being on the Union Pacific, the Denver Pacific, the Cheyenne and Burlington and the Cheyenne and Northern railroads. The railroad-shops of the Union Pacific railroad, which are located here, are built of brick and stone, and cost between four million and five million dollars. The state capitol, which covers nearly three acres of ground, is built of native sandstone, and cost three hundred thousand dollars. Public, private and denominational schools and a public library provide ample educational facilities. Cheyenne owed its first settlement to the discovery of gold in the Black Hills, but its present prosperity is largely due to the growth and profits of the cattle trade. Population 1880, 3,456; 1890, 11,693.

CHEYENNE INDIANS, an Indian tribe of the Algonquin family, settled near the Black Hills before the beginning of the present century. In 1825 the first treaty of friendship was made with them by General Atkinson. Later the tribe separated, and one part moved south. After this a number of treaties were negotiated between the Cheyennes and the Federal government. In 1861 a breach of treaty obligations led to war, and during negotiations for a peace, on Nov. 29, 1864, Colonel Chevington, of Colorado, attacked the Cheyennes in Sand Creek village and massacred one hundred of their braves. A prolonged and disastrous war followed. In 1865 the Southern Cheyennes agreed to go on a reservation, but the Dog Soldiers refusing, General Hancock burned their village in 1867. Another war ensued, in which General Custer almost decimated the tribe at Washita. The Northern Cheyennes continued peaceable. See INDIANS, Vol. XII, pp. 831, 832.

CHEYNE, GEORGE, a Scottish physician; born in Aberdeenshire in 1671; died at Bath in 1743. In 1700, after taking the degree of M.D., he repaired to London, where he practiced in winter, and in Bath in summer. In 1702 he published *A New Theory of Fevers* and a work *On Fluxions* which procured him admission into the Royal Society. Among his other works are *Philosophical Principles of Natural Religion; Essay on Health and Long Life;* etc.

CHEYNE, THOMAS KELLY, English clergyman and Biblical critic; born in London, Sept. 18, 1841, and educated at Merchant Taylors' School and Worcester College, Oxford. He was rector of Tendring, in Essex, from 1881 to 1885, when he was appointed Oriel professor of the interpretation of Holy Scripture at Oxford, and canon of Rochester. He was a member of the Old Testament Revision Company, and has contributed many articles on Biblical questions to the magazines and reviews. A critic of ripe scholarship and remarkable clearness in exposition, he has done much to advance Biblical science. His chief books are *The Prophecies of Isaiah* (1880; 3d ed. 1885); *Exposition of Jeremiah and Lamentations* (1883); and *The Book of Psalms, or Praises of Israel* (1888). No less than 13 articles on books of the Old Testament, etc., in this ENCYCLOPÆDIA are from his pen.

CHIANA (in ancient times, Clanis), a river in Tuscany, northern central Italy, formed by several streams from the Apennines, and falling into the Arno a few miles below Arezzo. Along with another river of the same name, it waters the level Val di Chiana, a marshy tract in which the waters of the Arno and Tiber unite. See AGRICULTURE, Vol. I, p. 406.

CHIANTI, a mountain range in the province of Siena, northern central Italy, clothed with olive and mulberry trees and vines. The mountain gives name to an excellent red wine grown here.

CHIAPAS, the most southern state of Mexico. The highlands have an agreeable climate, but the lowlands are hot and sickly. Its area is 27,222 square miles; capital, San Cristobal. Population 1890, 299,441.

CHIAROSCURO, the art of distributing light and shade in a picture, and especially of enveloping the figures or other parts of the scene represented in transparent half-tints or shadows very fine in tone. REMBRANDT (q.v., Vol. XX, p. 373–378) excelled all others in the rendering of the effects of chiaroscuro. In former times a drawing or picture in chiaroscuro meant a drawing executed in monochrome, and depending for its effect entirely on the contrast of light and dark tints. See also DRAWING, Vol. VII, p. 449.

CHIBCHAS. See COLOMBIA, Vol. VI, p. 156.

CHICA, a red substance, valuable as a dye-stuff, obtained by boiling the leaves of a species of bignonia (*B. Chica*), a native of the banks of the Cassiquiare and the Orinoco. It is used in the United States to produce red and orange shades on cotton and wool.

CHICACOLE, a town in the Madras province, India. See CICACOLE, Vol. V, p. 550.

CHICAGO is the largest interior city of the United States and the second in size on the Western Continent. The Federal census of 1890 gave the population as 1,099,850, an increase of more than 100 per cent since 1880, when the number of inhabitants was 503,185. The increase for the ten years previous had been almost as great, the number of residents in 1870 being 298,977. The school census, count of inhabitants by the Post-Office Department and police reports all unite in placing the

population in the summer of 1899 at more than two millions, which is made up of representatives of almost all nations of the earth. The Germans number almost four hundred thousand; those of Irish birth or extraction, about two hundred and fifty thousand; Bohemians, Poles, Swedes and Norwegians each claim from fifty to sixty thousand representatives; there is a large English, French and Scotch contingent, and several thousands each of Jews, Russians, Italians, Hollanders, Swiss, with about fifteen hundred Chinese. Among other nationalities constituting this cosmopolitan population are Armenians, Turks, Arabs and Japanese. Territory has been added from time to time until the area of the city in July, 1896, was 187.138 square miles. With this large population the death rate is less than that of some of the states, the reports for 1895 showing 24,183 deaths, or the equivalent of 15.1 per thousand inhabitants.

The city has an entirely level site, which has made the problem of drainage and the disposition of sewage an important and difficult one. There are more than six million lineal feet of sewers, over thirty-three thousand catch-basins and almost forty-three thousand manholes. Construction and repair has brought the cost of the sewer system up to a sum exceeding fifteen million dollars. In 1890 the state legislature provided for the formation of a drainage district, to be administered by commissioners elected by the people. The plan as adopted provided for the construction of a drainage canal, extending from Chicago to Lockport, a distance of 34 miles, there to connect with the Illinois River, and thus to reach the Mississippi. See CANAL, in these Supplements.

The city stretches along the west shore of Lake Michigan for a distance of almost twenty-five miles and ranges in width from six to eleven miles. The Chicago River and its north and south branches separate the city into three divisions, known as the north, south and west sides. By the school census of 1894, the population of these districts was as follows: North side, 308,212; south side, 562,980; west side, 696,465. There are nearly 2,466 miles of streets, of which about one half are paved and the remainder partly improved. The frontage of the river within the city, including docks, amounts to about forty miles, affording, with the canal, facilities for shipping unexcelled by those of any city in the world.

It being necessary to keep the river open for navigation by large vessels, the bridges are chiefly of the draw pattern. There are 54 swing-bridges, 2 bascule or jack-knife bridges, and 1 lift-bridge. Three tunnels under the river connect the north and west sides of the city with the south side, and are used by the cable and electric railways. Some forty viaducts protect portions of the city, where traffic is the heaviest, from the almost innumerable railway tracks, and plans are now formulated and accepted by both the city and railway companies whereby the tracks will be elevated above the grade crossing of the streets within the city limits.

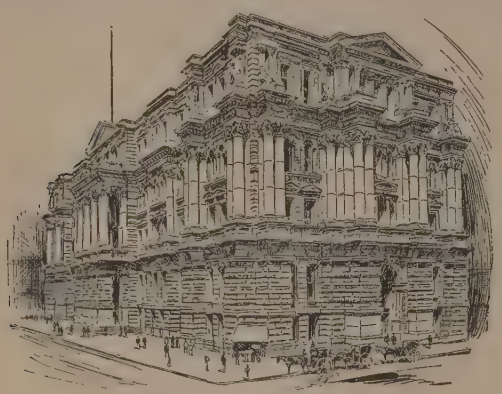
The main business portion of the city is bounded on the north and west by the Chicago River; on the east by the lake, and on the south by Harrison Street. Within this limited district are located the principal railway depots, the banks, the leading hotels, Board of Trade, Art Institute, leading stores, both wholesale and retail, the government building and offices of the different branches of the customs, revenue, pension and other services, and the lofty structures which have given Chicago a distinctive and colloquial name in this regard.

The park system is one of the most extensive in the world. The south side has two parks, the first containing 372 and the second 586 acres, the two embracing 27 miles of interior drives and over 50 miles of walks. The larger, Jackson, fronts on Lake Michigan for one and one half miles, has a system of lakes connecting with Lake Michigan, and was the beautiful site occupied by the buildings of the World's Columbian Exposition in 1893. Washington Park, from June to November, is rendered doubly attractive by magnificent displays of the landscape-gardener's art. The immense meadow of one hundred acres is a beautiful lawn skirted by timber, and the "Mere," a winding lake of thirteen acres, is a popular resort for boating in summer and skating in winter. These two parks are approached by roadways two hundred feet in width, known as Grand and Drexel boulevards. The west division parks are Humboldt Park, 200 acres; Garfield Park, 185 acres; and Douglas Park, 180 acres. They are all elaborately ornamented and kept in fine condition. On the north side is Lincoln Park, containing about two hundred and fifty acres, and with a lake shore drive several miles in length. It also has a zoölogical garden and many fine statues. There are, in all, some 1,975 acres in the different parks of the city, and all of them are connected by wide roadways, varying from 150 to 300 feet in width, and giving a continuous drive of 35 miles, making the longest continuous pleasure-drive in the world. The Sheridan Road is 36 miles in length, starting near Lincoln Park and winding along the shore of the lake to the village of Waukegan, Wisconsin. The new Lake Front Park, which extends from Randolph Street on the north to Park Row on the south, and from Michigan Avenue to the lake, contains 161.55 acres, the ordinance creating same being accepted in July, 1896. It is under the control of the South Park Commissioners, excepting that a tract of twenty acres north of Jackson Street, is devoted to the uses of the Art Institute, the Illinois National Guard, the Illinois Naval Militia, and a part of the park is intended for the site of the Field Columbian Museum.

The city government of Chicago is vested in a mayor and common council. Each of the 34 wards has two aldermen, elected by popular vote, one half of the body retiring each year. The mayor, city treasurer and city clerk are each elected for two years. The mayor appoints all heads of departments and bureaus, such as the comptroller, commissioner of public works, chief of police and fire departments, and others, subject to confirmation by the council. The council possesses all legislative power as to taxes, appropriations and the granting

of franchises, subject to a veto on the part of the mayor, which can be overruled by a two-thirds vote. Under the constitution of the state of Illinois the bonded debt of the municipality is limited to five per cent of the taxable valuation. The funded debt of the city amounted on the 1st of January, 1896, to about $17,000,000. The police force consisted, in 1896, of 3,255 men, with 45 patrol-wagons and ambulances and 250 horses. The total number of arrests for 1895 was 83,464, of which 67,370 were males and 16,094 females. The total amount of fines assessed was $301,555. The detective bureau arrested and turned over to officers from other cities 125 fugitives from justice. The cost of the maintenance of the department for 1895 was $3,421,875.

The fire department consisted, in 1896, of 108 companies, aggregating 1,116 men, under the command of a chief and assistant marshals. According to the report of the chief of the fire department, issued Jan. 1, 1896, there were 5,316 alarms responded to during the preceding year. The total value of the buildings, with contents, which suffered fire losses amounted to $120,794,760. Of this property



CITY HALL, CHICAGO.

$2,974,760, or less than 2½ per cent, was destroyed. The total insurance amounted to $73,443,646, and the loss over insurance to $219,555. The apparatus of the department included, in 1896, 84 steam fire-engines, 4 fireboats, 2 water-towers and 155,743 feet of hose. The value of all property in use by the department was $2,503,665. Both the police and fire departments are under civil-service rules, the board of civil service commissioners being appointed by the mayor of the city.

The city receives its water from cribs located in Lake Michigan, from two to four miles from shore. The water is conveyed through five tunnels under the lake, and distributed by seven pumping-works, capable of supplying 250,000,000 gallons daily. The amount actually furnished during the year 1895 was in excess of 63,000,000,000 gallons, or over 115 gallons per day for each resident of the city.

Hospitals and charitable institutions are numerous throughout the city, some being maintained by the county, some by the city, and many by denominational and private organizations. All are open to those in sickness and distress, without distinction of nationality or religion. The Cook County Hospital, one of the largest in the United States, affords relief to over five hundred resident patients. Attached to the hospital proper are a detention hospital for the insane, contagious diseases hospital and a morgue. Next in importance comes the Presbyterian Hospital, with maternity and convalescent departments; the Chicago Homœopathic Hospital, the Hospital for Women and Children, the Alexian Brothers' Hospital, the Augustana, the Bennett, the Chicago Emergency, the German, the Hahnemann, the Hebrew, the Michael Reese, the National Temperance, and more than a score of others, including many conducted by Sisters of Mercy and other Catholic organizations. There are 28 free dispensaries in the city, where the sick and poor are furnished with free medicine. There are many institutions devoted to the training of skilled nurses, some of whom devote their time and services to the poor. The citizens of Chicago voluntarily contribute more than $3,000,000 annually to the support of public charities. The organizations having in charge charitable and benevolent work include aid associations, manual training-schools, missions, industrial schools, refuges, homes, kindergartens, asylums, crèches, sanatoriums, and a great number of other similar institutions. A county agent looks after the outdoor poor, distributing county funds annually donated for that purpose. The county also maintains a poorhouse and infirmary, where about one thousand aged and indigent persons are taken care of. The County Insane Asylum is sustained from public funds, as is the Washingtonian Home, an institution for the care, cure and reclamation of inebriates. The Bureau of Charities is an organization designed to combine the different philanthropic organizations of the city and thus prevent duplication in administering relief, and in other ways harmonize the societies and expedite the work. (See CHARITY ORGANIZATION, in these Supplements.)

The school system is controlled by a board of education, appointed by the mayor. The school fund is a large one, being derived from property set apart for this purpose, in addition to an annual levy made by the city council. On July 1, 1896, there were 295 school buildings owned by the city, and 296 rented for school purposes. The average number of children attending the public schools for 1895 was 165,569, besides over 70,000 pupils attending private schools. There were 4,668 teachers in the public schools for the same year. Over $6,000,000 are set apart each year for school purposes. Besides over one hundred private schools, there are a large number of kindergartens. The leading institutions of advanced education are the Northwestern University, University of Chicago, Armour Institute, Chicago Athenæum and many theological colleges, as well as those devoted to the study of medicine, law and art. Every branch of education is represented in the technical and scientific institutions located in various parts of the city, and including dental, pharmaceutical and veterinary schools, as well as schools of business training, telegraphy, agriculture, manual training, brewing, etc.

All of the colleges and institutions of learning have excellent libraries, as have the prominent clubs.

The public libraries of the city are many, and have prominent positions among the best in the country. The Chicago Public Library has over 220,000 volumes, with a home circulation (report of 1896) of 1,173,586 volumes. It occupies at present the fourth floor of the City Hall. Some 30 branch delivery stations are maintained throughout the city, where citizens may draw books, the same as at the library. The new Public Library Building, ready for occupancy in 1897, extends for 365 feet along Michigan Avenue, has a width of 140 feet and is 90 feet in height. It is a two-story structure of Roman classic architecture, built of blue Bedford stone and granite. The interior construction is almost entirely of marble, steel and terra-cotta, and over the center of the structure a low elliptical dome forms an immense skylight. The floors are composed of steel beams and terra-cotta, or hollow-tile arches, and the building is practically fire-proof. The cost of the finished structure approximated $2,000,000. The Chicago Historical Society has the oldest public library in the city, rich in original documents, records and manuscripts. It is located in an absolutely fire-proof structure especially constructed for its use. The Newberry Library, situated on the block bounded by Clark

CHICAGO PUBLIC LIBRARY BUILDING.

Street, Dearborn Avenue, Oak Street and Walton Place, has a bequest, from the founder, of $3,000,000. Although but recently completed, it is largely patronized by the general public. There were, in 1896, over 120,000 volumes on its shelves. The Chicago Law Institute has a fine law library, located in the county building. The John Crerar Library was founded with a bequest of over $2,000,000. In many of the beautiful suburbs surrounding the city proper there are excellent libraries, the one at Pullman containing over 8,000 volumes, situated in the Arcade Building. Others are located at Evanston, South Chicago and Ravenswood.

There are about 650 churches within the limits of the city, divided among 30 denominations. In number of church edifices the Methodist Episcopal ranks first, the Lutherans second, the Roman Catholic third, and, following, the Congregational, Baptist, Presbyterian, Protestant Episcopal and Jewish, with about 70 buildings belonging to the remaining 21 denominations.

Chicago has a great number and variety of public buildings and halls. First among these is the Auditorium, costing, exclusive of the ground, $5,000,000. It has a frontage of 710 feet, and is surmounted with a tower 270 feet high. The main hall is capable of seating 8,000 people. The city contains many other halls for public gatherings, seating from 3,000 to 50,000. There are many fine office buildings, containing from 400 to 600 rooms each, and ranging in height from 12 to 20 stories. The most marked development of architecture among the buildings of Chicago was within the decade ending with 1895. The Masonic Temple is 275 feet in height, occupying a base 170 by 113. Other notable buildings, both for their extreme height and architectural beauty, are the Monadnock, Rookery, New York Life, Home Insurance, Fisher, Hartford, Tacoma, Security, Title and Trust, Chamber of Commerce, Stock Exchange, Marquette, and more than a score of others. The new Coliseum Building, located at Sixty-third Street and Jackson Park, occupies the entire square between Washington and Jefferson avenues. The building is 700 feet in length, 330 feet in width and 100 feet in height. It contains 281,000 square feet of floor space, making it the largest building under one roof in the United States. It is three times the size of Madison Square Garden, in New York City, and can accommodate 50,000 people. During the national convention held by the Democrats in July, 1896, 27,000 people were present, occupying scarcely half the space devoted to seats.

The most noted residence thoroughfares in the city are Grand, Michigan, Drexel and Washington boulevards, Wabash, Calumet and Prairie avenues, La Salle, Pine, Rush and Cass streets and the Lake Shore Drive.

The government maintains many branches of service in the city, among which, in addition to the Post-Office, are the United States Subtreasury, United States Appraisers Office, Internal Revenue Department, Custom-House, Lighthouse Department, United States Army Headquarters, United States Courts, United States Pension Agency, Signal Office, Secret Service, Treasury Special Agents, etc. The building in use as a post-office for some years, located on the square bounded by Dearborn, Adams, Clark and Jackson streets, although costing more than four million dollars, was so faulty in construction as to be condemned, in 1895, as unsafe and unfit for use. It was demolished during 1896, and is to be superseded by a structure built in the Chicago style of architecture, and large enough to accommodate the entire government force of officials and employees.

Chicago stands as the greatest railway center in the world. It is the terminus of nearly all of the great trunk lines of the United States, Canada and Mexico, which occupy six very large and handsome depots. Twenty-one great railroad systems center here, the number of miles of railway tributary to the city being about 112,000. A belt line connects all of these roads, doing away with the necessity of through freight entering the city for transfer. There are within the city limits some 1,500 miles of track. In addition to the immense carrying trade of the railway lines, the merchant marine service is one of constantly increasing dimensions. The average number of vessels arriving and departing annually is somewhat over 10,000, with a tonnage near 6,000,000.

Many fine statues adorn different portions of the

city. In Lincoln Park are located the following: Hans Christian Andersen, the Danish author; La Salle, the explorer; Gen. U. S. Grant, equestrian, life-size, surmounting a granite arch; President Lincoln, life-size, standing; Linnæus, the Swedish naturalist; typical group of Ottawa Indians; Schiller, the German poet; and Benjamin Franklin. Those of other portions of the city are President Garfield, in Garfield Park; Christopher Columbus, in Lake Front Park; life-size of Hon. Stephen A. Douglas, surmounting a granite shaft 104 feet high, marking his grave in Douglas Monument Square; Drake Fountain and Columbus Statue, occupying the space between the City Hall and the Cook County Courthouse; Fort Dearborn Massacre Group, marking the spot of the massacre at Eighteenth Street and Prairie Avenue; Police Monument, Haymarket Square, the scene of the anarchist riot of May 4, 1886; equestrian monument of Gen. Philip A. Sheridan, Union Park; Drexel Fountain, Fifty-first Street entrance to Washington Park; Michael Reese, at the Michael Reese Hospital; and many minor, though handsome, monuments, fountains, tablets, etc.

The banks of the city exchange United States coin or bills for the money of all countries, and 30 foreign governments maintain consuls in this city. The street-railway business of Chicago is conducted by 29 distinct corporations, with an aggregate capital stock of $110,089,000, and a funded debt of $77,119,500, making a total capitalization of $187,208,500. During the period from 1886 to 1896 the increase in capitalization has been more than $1,464,000 per month. At the beginning of 1896 there were 342.21 miles of street-railway in operation within the city limits, of which 41.95 was cable road, 255.64 was electric, 25.98 was elevated, and 18.46 was horse. The aggregate traffic on the elevated and surface lines, not including the steam-railroads, was 273,000,000 passengers during the year 1895. The city has many social clubs, prominent among them being the Union League, with a membership of 1,200, and owning a magnificent club building on Jackson Street, near the intersection of Dearborn. Other prominent clubs are the Chicago, Marquette, Ashland, La Salle, Calumet, Standard, Illinois, Iroquois, Lincoln, Grant, Hyde Park, Englewood, Kenwood, Oakland, Union, Union Veteran and Washington Park. The most of these possess fine clubrooms and halls. Of athletic and sporting clubs, the leading are the Chicago Athletic Association, the Farragut Boat Club, the Chicago, Evanston and Lincoln Park Yacht clubs. There are also several cricket, golf, cycling and baseball clubs. In the line of field-sports the prominent clubs are the Audubon, Mak-saw-ba, Tolleston and Gun Club. There are a number of social clubs formed for the purpose of discussing the leading topics of current interest, state social organizations, and many professional clubs.

There are 699 newspapers entered at the Chicago post-office, of which 35 are dailies; 283 weekly; 10 tri-, semi- and bi-weekly; 271 monthly; 54 semi-, tri- and bi-monthly; and 46 are quarterly and semi-quarterly. In addition to the newspapers of the city, the making of encyclopædias, subscription books and atlases and railroad-printing is more extensively carried on than in any other city of the Union. As a publishing center, the city stands unrivaled.

The receipts of the Chicago post-office for the postal year ending March 31, 1896, amounted to $5,069,532.84, and the expenditures to $2,169,713, leaving a surplus of $2,899,819. The postal district covers an area of 187 square miles, with free delivery in 127.59 square miles. There are 58 substations, 15 branch post-offices and 190 stamp agencies. The total number of employees in all branches of the service in 1896 was 2,459, of 20 different nationalities. The amount of mail handled for the year was 800,000,000 pieces; 99.82 per cent of all mail is delivered without delay.

Chicago has an abundance of first-class hotels. The principal ones in the business district are the Auditorium and its Annex, the Great Northern, the Palmer, Victoria, Sherman, Tremont, Wellington, and farther from the heart of the city, the Virginia, the Metropole and Lexington. There are hundreds of European and family hotels and thousands of private boarding-houses. The theaters are many and well patronized. They comprise the Auditorium, Central Music Hall, McVicker's, Hooley's, Chicago Opera House, Columbia, Schiller and Grand Opera House in the central section, with many smaller houses farther out.

At the beginning of 1896 there were 24 national banks, with an aggregate capital of $21,800,000; surplus and profits, $12,692,720. The 26 state banks had a capitalization of $12,824,500; surplus and profits, $22,313,479. The national banks' deposits were $120,413,444. The state and savings banks carry over $75,000,000 of deposits. The total clearings of the associated banks during 1895 were $4,614,979,000.

The Union Stock Yards and Transit Company, an Illinois corporation (operated by the Chicago Junction railways, a New Jersey corporation), with a capital of $13,000,000, conduct the stockyards, which afford ample facilities for handling the large amount of live-stock that seeks the Chicago market. The yards are about one mile square, extending from Thirty-ninth to Forty-seventh streets, and from Halsted Street to Ashland Avenue. The entire area is covered with stalls built of heavy plank. In 1896 a second tier of stalls (with alleyways, etc.) was built directly over about one half of the ground-stalls, double-decking that part, and of course doubling the capacity. The yards give shelter to about 15,000,000 head of live-stock a year, valued at about $200,000,000.

In manufacturing, Chicago stands second only to New York among the cities of the Union. The statistics for 1895 are as follows: Number of firms, 10,430, employing 235,000 persons, whose wages approximated $125,000,000. The capital employed exceeded $300,000,000, and the value of the product almost $700,000,000. Meat-production heads the list in valuation, exceeding, for the year mentioned, $150,000,000. In order of value, followed brass, copper, etc.; iron and steel; textiles;

iron and wood; brewing, distilling and tobacco; manufactures of wood; leather; printing; brick and terra-cotta.

The trade and commerce of the city is extensive, the value of the wholesale business for 1895 aggregating $504,675,000. The leading lines were dry goods and carpets; groceries; boots and shoes; lumber; clothing; manufactured iron; jewelry, watches and diamonds; books, stationery and wall-paper; $178,913,809 worth of flour and grain were received in 1895, and $162,602,137 worth shipped. The total value of produce received during the year was close to $400,000,000. See also CHICAGO, Vol. V, pp. 610–613.

CHICAGO SANITARY AND SHIP CANAL. See CANAL, in these Supplements.

CHICAGO, UNIVERSITY OF. See UNIVERSITY OF CHICAGO, in these Supplements.

CHICKADEE, a name popularly applied to the black-capped titmouse (*Parus montanus* or *atricapillus*) and related birds. They remain in the Northern United States during all the year, and in winter are often called "snow-birds."

CHICKAHOMINY, a river in eastern Virginia, which rises some 20 miles N.W. of Richmond; flows in a southeasterly direction for some 75 miles and then empties into the James River. The banks of the Chickahominy were the scene of several conflicts in McClellan's campaign against Richmond in May and June, 1862. In its swamps and morasses, or in proximity to them, occurred the battles of Seven Pines and Fair Oaks, May 31—June 1, 1862; Mechanicsville, June 26; Savage's Station, June 29; White Oak Swamp, June 30, 1862; and Cold Harbor, June 3, 1864. In the seven days' fight at the end of June, the Confederate loss was double that of the Northern army, and if McClellan had but followed up his advantage he could have taken Richmond and ended the war.

CHICKAMAUGA CREEK, a tributary of the Tennessee River, rising in Walker County, Georgia, which, after flowing northeastward and northward, enters the Tennessee River about six miles above Chattanooga. Here, on September 19–21, 1863, was fought the BATTLE OF CHICKAMAUGA (q.v.).

CHICKAMAUGA, BATTLE OF. The city of Chattanooga, Tennessee was, in 1863, the bone of contention between the Northern and Southern armies. The town was the key to the fertile country to the south, and its railroad connections made it invaluable to either side. After the battle of Stone River—won by Thomas and Miller—Rosecrans had remained for months inactive, until at last, in response to pressure from Washington, he began his preparations for a southern movement. His army was divided into three corps—those of Thomas, Crittenden and McCook. At the outset the heavy rains and consequent rise in the rivers intersecting the country over which the Federal army moved, necessarily rendered Rosecrans's movements somewhat slow. The army under his immediate command numbered about sixty thousand, while Burnside, who was supporting the army of the Cumberland by concurrent movements, was in command of twenty thousand more. To oppose these two bodies of men, Bragg had fifty thousand men at Shelbyville and WarTrace, while Buckner, at Knoxville, had ten thousand more. Rosecrans's first scheme was to turn the Confederate right. Bragg fell back and destroyed all the lines of communication behind him as he retreated toward Chattanooga. Rosecrans's movements were greatly impeded by the necessity of repairing the damage thus done, meantime suffering sharp criticism from the government at Washington. Bragg, too, came in for his share of dictation from his government, and when he had been reinforced by Generals Polk and Longstreet, he was peremptorily ordered to make a stand and fight. In obedience to these directions, he posted Polk in and around Chattanooga, while Hardee held the Knoxville railroad. This disposition of the Confederate forces rendering Chattanooga too strong for direct attack, Rosecrans moved down the river and crossed on pontoons and a bridge which had been repaired, hoping thus to turn the Confederate left and gain the rear. Meantime the Federal left, under Crittenden, was ordered to make a direct attack on Chattanooga, while Thomas was to march upon Lafayette, and McCook was to threaten the Confederate communications with the south. On the 21st of August, Crittenden was before Chattanooga and began a bombardment, and by the 1st of September the entire Union army was in the positions designated by Rosecrans. Bragg was not slow to take advantage of the fact that in the execution of these movements Rosecrans had separated his army and interposed between them difficult mountain country. In order to take advantage of this fact, Bragg ordered Hill to march upon Lafayette, at the same time evacuating Chattanooga—intending to crush Rosecrans's left center before he could concentrate his forces. Rosecrans seemed wholly unaware of the intention of Bragg, believing him to be in retreat, instead of contemplating an attack on the weakened Union center and left. Bragg made all the preparation possible for the success of his plans, and there is no doubt that had he received the co-operation of his subordinates, he would have succeeded. As it was, his success was too near fruition to give the Union army anything but a disputed tactical victory. The delay caused by lack of co-operation gave Thomas and McCook opportunity to effect a junction of their forces—not a moment too soon. Crittenden had encountered the Confederates at Ringgold, and had retreated across the Chickamauga; and on the 18th of September the entire Union army was placed in position on the right bank of the Chickamauga. On the night of the same day the army moved north by the flank, Thomas being in front and McCook to his right, the two commands overlapping. Crittenden was in the rear of the center, Gordon Granger's command being held in reserve at Rossville, while the other reserves were scattered about in positions near Chattanooga. The Confederate forces lay on the other bank of the Chickamauga River that night. It had now become clear that the intention of Bragg was to attack the Union center, turn its left, and cut Rosecrans off from Chattanooga. Polk, with two divisions, held the Confederate right, while Hood occupied the left. The battle was begun by Bragg

throwing thirty thousand men across the Chickamauga and projecting and concentrating division after division on Thomas's front. At first Thomas's advance wavered and retreated, but on the reserve coming up, the Confederates were in turn driven back. The attack was renewed by the Confederates, and Thomas was again forced back. At this juncture General Hazen, by a well-directed artillery fire, forced the Confederates to retire. Another attack of less strength than the preceding was made, when night put an end to the conflict. During the darkness new disposition was made of both forces, and on the next morning (20th) at ten o'clock the entire Confederate right was thrown against Thomas, who now occupied the extreme left of the Union army. Reinforcements were hurried up to him, and in closing up from the right center a gap was left in the Federal front. Into this gap Longstreet poured his men, sending the right and center flying in the utmost confusion from the field, leaving Thomas on the left to his fate; which then seemed to be certain defeat. Rosecrans and his staff were swept from the field by the uncontrollable rout, and Thomas was left in command. Far to the rear, at the intersection of two roads, one leading to Chattanooga and the other to Thomas's position, Rosecrans halted long enough to send back his chief of staff, Gen. J. A. Garfield, to ascertain the import of the heavy firing still heard from Thomas's command, and then continued his flight to Chattanooga, to prepare for the holding of that town at all events. Meantime, Thomas, termed thenceforth "the Rock of Chickamauga," was receiving a terrific hammering, Polk assaulting his right and Longstreet his left. He was slowly forced back, and at one time having a gap left in his line, Longstreet rushed in, and for a time disaster and defeat seemed to be the inevitable result for the Union army, but Granger hurried up his reserves and strengthened the weak place, thus averting the impending danger. Nightfall put an end to the second day's fight, and Thomas fell back slowly and in good order, capturing five hundred prisoners as he retired. It is yet an unexplained circumstance why Bragg did not continue the fight during the night of the 20th, when Thomas was exhausted and had resisted to the last extreme of his tenacity, and had not one more effort in reserve. The night was one on which the full moon shone unobscured by a cloud, and the battle could have been continued to the irreparable damage of the Union army. This was not done, and the next morning found Thomas in a new position, from which he offered battle to Bragg, the offer being declined. On the evening of this day Thomas rejoined the army at Chattanooga.

The battle of Chickamauga was undoubtedly a tactical victory for the Confederates, but this victory had been dearly bought. Bragg stated his losses as two fifths of his entire force. But of far greater importance to the Confederacy was the loss of Chattanooga, to which the Federal army had retired, and which they now proceeded to fortify. The Federal losses were in the neighborhood of seventeen thousand men, and arms in proportion, but Chattanooga was worth the price, and this seemingly disproportionate loss of life was undoubtedly compensated by the fact that the possession of this stronghold practically decided the war in the far south. On the 16th of the following month General Rosecrans was relieved of his command. For the subsequent battle of Chattanooga, see CHATTANOOGA, in these Supplements. In 1896 the Federal government opened a handsome national park on the site of the battlefields. See PARKS, NATIONAL MILITARY, in these Supplements.

CHICKAMAUGA CAMP or CAMP THOMAS, a camp of concentration, established by the War Department, in the national park alluded to in the preceding article, as a rendezvous for troops mobilized in anticipation of the war with Spain. The camp was opened on the 15th of April, 1898, and thereafter a stream of regulars and volunteers poured in. On the 23d of May the First Division of the First Army Corps, 9,000 strong, was reviewed by Gen. James H. Wilson. By the 30th of May additional land had to be taken for camp purposes. The sanitary arrangements of the camp were very faulty, and typhoid fever, and other diseases incidental to the massing of large bodies of men, developed. These matters were made the subject of investigation.

CHICKAREE, a popular name of the red or Hudson Bay squirrel (*Sciurus hudsonius*), inhabiting British America and the northern United States.

CHICKEN-POX or CRYSTAL POCK, a contagious febrile disease, chiefly of children, resembling a very mild form of smallpox, but attended with little fever and very little danger. It is distinguished by an eruption of vesicles or blebs, which rarely become pustular or yellow, and leave a very slight incrustation, which falls off in a few days, leaving little or none of the pitting usual in smallpox. It has been supposed to be smallpox modified by previous vaccination, but this opinion is not generally accepted.

CHICKERING, JONAS, an American piano manufacturer; born in New Ipswich, N. H., April 5, 1797; died in Boston, Mass., Dec. 6, 1853. His father was a blacksmith. Young Chickering received a common-school education and was apprenticed to a cabinet-maker. In 1818 he was employed by a Boston pianoforte maker, and in 1823 became himself a manufacturer of pianos. His business extended until he produced annually about 2,000 instruments. In 1852 his factory was burned, and before the new one had been completed Mr. Chickering died. He made many valuable improvements, and for many years kept the lead of all other makers. He was noted for his business enterprise, public spirit, and benevolence. After his death the business passed into the hands of his three sons; the eldest, THOMAS EDWARD (born in Boston, Oct. 22, 1824; died there, Feb. 14, 1871), succeeded his father, and distinguished himself in the Civil War. CHARLES FRANK, second son (born in Boston, Jan. 20, 1827; died in New York, March 23, 1891), entered the factory, represented his father at the London Exhibition of 1851, and invented the "new scale," now in use, etc.

CHICK-PEA. See GRAM, Vol. XI, p. 36.

CHICKWEED (*Stellaria media*), one of the most common weeds of gardens and cultivated fields. It is a native of most parts of Europe and of Asia, appear-

ing during the colder months even on the plains of India; an annual, with a weak procumbent stem and ovate leaves, very variable; some of the smaller varieties in dry, sunny situations, sometimes puzzling young botanists from having no petals or only five or three instead of ten stamens, but always characterized by having the stem curiously marked with a line of hairs, which at each pair of leaves changes from one side to another, and in four changes completes the circuit of the stem. The leaves of chickweed afford a fine instance of the sleep of plants, closing up on the young shoots at night. Chickweed is a good substitute for spinach or greens, although generally little regarded except as a troublesome weed, or gathered only by the poor to make poultices, for which it is very useful, or for feeding cage-birds, which are very fond of its leaves and seeds. A number of species of a nearly allied genus, *Cerastium*, also bear the name of chickweed, or mouse-ear chickweed, and the name is occasionally given to other plants, either botanically allied, or of somewhat similar appearance.

CHICLAYO, a town of northwestern Peru, 12 miles S.E. of Lambayeque; it is the center of a valuable sugar district. Population, 11,325.

CHICO, a town and the former capital of Butte County, central northern California, situated on Chico Creek, 95 miles N. of Sacramento, on the Southern Pacific railroads. It is the trade-center of a fertile district, and an important shipping-point for lumber. It is the seat of an academy, and contains a variety of manufactories. Population 1890, 2,894.

CHICOPEE, a city of Hampden County, southwestern Massachusetts, on the Boston and Albany and the Boston and Maine railroads, four miles N. of Springfield. Among the principal industries are the cotton-mills of the Dwight Company, with a capital of $2,000,000. The Chicopee River affords ample water-power for the numerous mills and manufactories. A convent a high school and several churches are located here, and national and savings banks. Population 1890, 14,007; 1895, 16,420. See also CHICOPEE, Vol. V, p. 614.

CHICOUTIMI, a village of Chicoutimi County, northern Quebec, on the Saguenay River, about 75 miles W. of its mouth, and on the Quebec and Lake St. John railroad. There is here a convent of the Good Shepherd. Large quantities of lumber are shipped direct from here to Great Britain. Population 1891, 2,277.

CHIEF JUSTICE, the principal judge of the United States or a state supreme court, corresponding in rank and dignity with the English Lord Chief Justice (q.v., under JUSTICE, Vol. XIII, p. 789). The chief justice of the supreme court of a state in the Union has, as a rule, few functions other than to preside over the sittings of the supreme court of his state. The chief justice of the United States supreme court ranks next to the President in official dignity. He receives a salary of $10,500; presides over the sessions of the supreme court; administers the oath to the President and Vice-President at their inauguration; presides over the Senate when the President is tried on articles of impeachment, and attends at least one term of the circuit court in each two years.

CHIEM–SEE, a lake of southeastern Bavaria, the largest in the country. It lies about 42 miles S.E. of Munich. It is 12 miles in length and 9 miles in breadth, and is situated at an elevation of more than fifteen hundred feet above the sea.

CHIFF–CHAFF. See WREN, Vol. XXIV, p. 688.

CHIGNECTO BAY, an inlet at the head of the Bay of Fundy, in British North America. It separates Nova Scotia from New Brunswick, is thirty miles long and eight broad, and has an isthmus only fourteen miles in width between it and Northumberland Strait, in the Gulf of St. Lawrence. An extraordinary ship-railway, designed to transport laden vessels, has been partially completed across this isthmus. It is quite straight, laid with two pairs of 110-pound steel rails, 16 feet apart, and designed for vessels up to 2,000 tons. It is said that $4,000,000 have been spent, and $1,500,000 more will be required to complete it, but it is now tied up, awaiting the necessary funds.

CHIGOE OR JIGGER. See FLEA, Vol. IX, p. 301.

CHIH–LI OR PECHIHLI, PROVINCE OF. See CHINA, Vol. V, p. 633.

CHIHUAHUA, the largest state of Mexico, bounded on the north and northeast by New Mexico and Texas; has an area of 83,746 square miles, and a population of about 226,000. In the east is the Bolson de Mapima, a vast desert of sand and alkali plains; in the south and west the surface is mountainous, and there are numerous rivers. The state is better adapted for stock-raising than for agriculture; the fertile districts are mainly confined to the valleys and river-courses. Cotton is grown in the south. The silver-mines were for centuries among the richest in Mexico, and though many are now abandoned, mining is still the chief industry. The state is traversed by the Mexican Central railway. The capital, Chihuahua, 225 miles south of El Paso by rail, rises like an oasis in the desert, among roses and orange-groves. It is well built, and is the center of considerable trade with Texas. Founded in 1691; population 1890, 12,116.

CHI HWANG TI OR CHE HWANG–TE. See CHINA, Vol. V, pp. 643, 644.

CHILBLAINS. See MORTIFICATION, Vol. XVI, p. 849.

CHILD, FRANCIS JAMES, an American scholar and educator; born in Boston, Feb. 1, 1825. He was graduated at Harvard in 1846, traveled and studied in Europe in 1849–50, and in 1851 became professor of oratory and rhetoric at Harvard. He held this position until 1876, at which date he exchanged the chair for that of English literature. He especially distinguished himself in Anglo-Saxon and the earliest English literature, having few, if any, superiors as a Chaucerian scholar. He edited the works of Spenser and issued his first collection of *English and Scottish Ballads* (1857–58), and superintended the American edition of the British poets. Other works included *Four Old Plays* (1848); a collection of *Poems of Sorrow and Comfort* (1865); *Observations on the Language of Chaucer and*

Gower, made a part of *Early English Pronunciation*, published in London (1869). His reputation mainly rests on his collection, *The English and Scottish Popular Ballads* (1882–92), which has passed through many editions and enlargements since 1858. He died at Boston, Sept. 11, 1896.

CHILD, Sir Josiah (1630–99), a London merchant. See Political Economy, Vol. XIX, p. 357.

CHILD, Lydia Maria, authoress; born in Medford, Massachusetts, Feb. 11, 1802; died in Wayland, Massachusetts, Oct. 20, 1880. The daughter of David Francis, a baker, she was educated in common schools and by her brother, the Rev. Convers Francis, D.D. She taught for one year in a seminary in Medford, Massachusetts, and kept a private school in Watertown, Massachusetts, from 1824 till 1828, when she was married to David Lee Child. At the age of seventeen she wrote her first novel, and five years afterward became editress of the *Juvenile Miscellany*. William Lloyd Garrison interested Mr. and Mrs. Child in the subject of slavery, and soon after Mrs. Child began to write on the question. With her husband she became early interested in the antislavery movement, and she published *An Appeal to That Class of Americans Called Africans* (Boston, 1833), which was the first antislavery work printed in America in book-form. In 1841 she removed to New York, where she was editress of the *National Antislavery Standard* until 1843, when her husband became editor-in-chief, and she acted as assistant until 1844. Mr. and Mrs. Child spent the remainder of their lives in Wayland, Massachusetts. She contributed largely to aid the Union soldiers during the Civil War, and afterward helped the freedmen, and gave lavishly for the support of schools for the negroes. Her antislavery writings contributed greatly to the formation of public sentiment, and her letters replying to rebukes from Governor Wise and Mrs. Mason, published in Boston in 1860, had a circulation of 300,000. When John Brown was a prisoner at Harper's Ferry, she sent a letter offering her services as nurse. Mr. Brown declined, but asked her aid for his family, and she responded to the request. Mrs. Child was the author of many books, among which were *Hobomok: The Rebels; The History of Women; Letters from New York; Fact and Fiction; Looking Toward Sunset;* and *The Progress of Religious Ideas.*

CHILD, Theodore, an author and general writer; born in Liverpool, in 1846. After graduation at Oxford in 1877, he went to Paris as correspondent of the London *Telegraph*, and in addition to writing for that paper contributed many able articles on art and literature for English and American magazines. He also acted as correspondent of the New York *Sun* and the London *World*. He was the European literary agent of the publishing house of Harper and Brothers for a number of years before his death, which took place Nov. 2, 1892, at Ispahan, Persia, whence he had gone to prepare the data for a book on India and the Afghan question. He had traveled much in Asia, and published a history of the South American republics after an extended visit to them.

CHILDERMAS or HOLY INNOCENTS' DAY, observed in the Roman Catholic and Anglican churches on the 28th of December, to commemorate the slaughter of the children in Bethlehem by order of Herod. It is one of the anniversaries which were retained in the Anglican Church at the Reformation.

CHILDERS, Hugh Culling Eardley, an English statesman; born in London, June 25, 1827; was educated at Cambridge, went to Australia, and sat in the legislature of Victoria. In 1857 he returned to England as agent-general of that colony, and in 1859 was elected to Parliament as a Liberal from Pontefract. He was a Lord of the Admiralty under Palmerston and Gladstone; became Chancellor of the Duchy of Lancaster in 1872, Secretary of War in 1880, Chancellor of the Exchequer in 1882 and Home Secretary in 1886. He died in London, Jan. 29, 1896.

CHILDREN'S AID SOCIETY. See Reformatories, in these Supplements.

CHILDREN, Societies for the Prevention of Cruelty to, had their origin in the resolve of Henry Bergh, who, in 1874, established, in his New York Society for the Prevention of Cruelty to Children, the first society of the kind in the world. For a while he had tried to help the children by the officers of his Society for the Prevention of Cruelty to Animals (q.v., in these Supplements), but he speedily found the scope of work ample enough for a separate organization. It was incorporated as the New York Society for the Prevention of Cruelty to Children in 1875, with John D. Wright as president until his death in 1879. Then Elbridge T. Gerry gave the society his service, and with G. Fellows Jenkins as secretary, it has proved potent enough to secure much beneficial legislation, including a revision of the penal code of the Empire State in the interests of its wards, and has been prolific enough to be the parent of 154 American and 32 foreign societies, scattered through the principal cities of the world.

As regards the parent society, the annual report shows that during an existence of 21 years, up to 1895, 95,481 complaints were received and investigated, involving the care and custody of 286,443 children; 38,318 cases were prosecuted; 35,270 convictions secured; 62,535 children rescued and relieved.

In the year 1895, 8,523 complaints were received and investigated, 3,301 prosecuted, 3,249 convicted, and 5,350 children rescued and relieved from destitution and vicious surroundings. The reception-rooms sheltered, fed and clothed 3,994 children, and 2,058 cases were investigated at the request of the city magistrates and courts. These cases involved applications for the commitment of 3,455 children; 1,645 of these were committed and 1,810 found to be improper cases—thus saving to the city and county of New York, at the *per capita* allowance of $104 per year for each year the children remained therein, the total sum of $188,240. With the co-operation of the city magistrates, the society was able to collect from the parents of children committed to the institutions $5,416.10, and that amount was paid to the comptroller of the city and county of New York, to be credited to it.

Of kindred societies outside the United States, one of the oldest, and perhaps the best known, is the English National Society for the Prevention of Cruelty to Children, to which the Rev. Benjamin Waugh has given his life-work as director. His fame would be secure did it rest alone upon the passage of the Children's Charter Act of Aug. 26, 1889. This, his conception of what the law of England should be as regards children, swept away at one stroke, to use the language of a famous statesman, "the relics of a shameful past."

CHILDS, GEORGE WILLIAM, an American publisher and philanthropist; born at Baltimore, May 12, 1829. In his boyhood he settled in Philadelphia, where he obtained employment as a shop-boy in a bookstore. At the age of 18 he set up in business for himself, and at 21 became a member of the firm of R. E. Peterson and Company, afterward Childs and Peterson. In 1864 he purchased the Philadelphia *Public Ledger*, which, under his management, grew to be a very influential journal. His aim was to eliminate all sensational matter and to conduct a clean and reliable family newspaper. Mr. Childs was noted not only for his success as a journalist and publisher, but also for his unostentatious philanthrophy. He established at Colorado Springs a home and sanatorium for aged printers, and was a generous benefactor of other charities. He was associated in his philanthropic endeavors and in private friendship with A. J. Drexel, and if he had a fault, it was the ease with which his purse-strings could be pulled apart. He placed stained-glass windows in Westminster Abbey to commemorate Cowper and Herbert; erected a Shakespeare memorial fountain at Stratford-on-Avon; was a collector of autographs and art treasures; and in 1890 he published his *Recollections*. He died in Philadelphia, Feb. 3, 1894.

GEORGE W. CHILDS.

CHILE OR CHILI. For the purposes of local government the republic is now divided into provinces, and the provinces into departments. According to the rearrangement of 1887, there are 23 provinces, subdivided into 74 departments and 1 territory. The Senate is elected by the provinces for 6 years; the Chamber by the departments for 3 years, by electors possessing a small property qualification. The census of Nov. 26, 1885, gave the area of the republic as 293,970 square miles, and the population as 527,320. The estimated population in 1894 was 2,963,687, including about 50,000 American Indians and Auracanians. The capital is Santiago, with a population of 250,000. The constitution of the Chilian republic is on the United States model, but the President holds his office for five years and is not re-eligible until after an equal lapse of time. Several of these rulers, however, had virtually arranged for their own successors, and it was in attempting this, together with other high-handed proceedings, that President Balmaceda (q.v.) aroused, during 1890, the bitter opposition of Congress. The culmination was in January, 1891, when the navy, under Admiral Montt, revolted in favor of the legislative or Congressionalist party. The country became at once divided into two hostile camps, while Balmaceda, as commander-in-chief, took active control of the army, and Congress set about raising an army to oppose him.

A fierce and vindictive war ensued, in which great cruelty, as well as bravery, was displayed on both sides. This continued throughout the summer of 1891, and was only brought to an end by the rout of Balmaceda's forces in the month of August, the President himself becoming a fugitive and shortly afterward a suicide. The Junta, as the Congressional government was called, at once took possession of the cities and entered the capital in triumph. It was during this period of transition that some of its followers committed an outrage, at Valparaiso, on the crew of the United States cruiser *Baltimore*, leading to a demand for reparation from our own government. This was acceded to after some parley, and meanwhile the new *régime* in Chile was acknowledged by the various powers, and honestly entered on the task of reconstruction left for it by civil war. Don Jorge Montt, the patriotic admiral of the fleet, was installed as President of Chile in January, 1892, and filled the office until the end of 1896, being succeeded by Señor Errazuriz, the candidate of the coalition or Liberal-Conservative party, on Jan. 1, 1897.

The difficulty with the United States arising out of the Valparaiso incident was atoned for by a salute to our flag, and an indemnity paid to the victims or their families. See also CHILI, Vol. V, pp. 616–624.

CHILIASM. See MILLENNIUM, Vol. XVI, pp. 315–318.

CHILLICOTHE, a city of Peoria County, northern central Illinois, on the Illinois River and the Chicago, Rock Island and Pacific railroad, 16 miles N.N.W. of Peoria. It is important as a grain-shipping center, and is frequented as a summer resort. Population 1890, 1,632.

CHILLICOTHE, a city, the capital of Livingston County, northwestern Missouri, at the junction of the Chicago, Milwaukee and St. Paul, the Hannibal and St. Joseph (C. B. & Q.), and the Wabash railroads, 75 miles E. of St. Joseph. It is the chief town of the Grand River valley; has factories of machinery, lumber, and flour; and is the seat of an academy. Pop. 1890, 5,717; 1897, about 7,500.

CHILLICOTHE, a city and the capital of Ross County, southern central Ohio (see Vol. V, p. 624). The Ohio canal and the Marietta and Cincinnati and Scioto Valley railroads pass through the city. The courthouse is a fine stone edifice. There are also a high school, public library, and numerous factories of carriages, paper, machinery, and farming implements. Population 1880, 10,938; 1890, 11,288; 1897, about 13,500.

CHILLINGHAM CATTLE. See CATTLE, Vol. V, p. 245.

CHILLON, a celebrated castle and fortress of Switzerland, in the canton of Vaud. It is situated on the east end of the Lake of Geneva, on an isolated rock, almost entirely surrounded by deep water, and is connected with the shore by a wooden bridge. The castle is said to have been built in 1238 by Amadeus IV of Savoy. It long served as a state prison, but is now used as a magazine for military stores. It is celebrated as the place of confinement of FRANÇOIS DE BONNIVARD (q.v. Vol. IV, p. 36), the "Prisoner of Chillon" and subject of Byron's poem.

CHILLS. See *Malarial Fever* and *Pneumonia*, under PATHOLOGY, Vol. XVIII, pp. 394, 396.

CHILOGNATHA AND CHILOPODA. See CENTIPEDES, Vol. V, pp. 340, 341.

CHILTERN HUNDREDS. See CHILTERN HILLS, Vol. V, p. 626.

CHILTON, a city and the capital of Calumet County, central eastern Wisconsin, 95 miles N.W. of Madison, on the Manitowoc River, and on the Chicago, Milwaukee and St. Paul railroad. It is chiefly an agricultural station. Population 1890, 1,424.

CHIMÆRIDÆ, a family of fishes. See ICHTHYOLOGY, Vol. XII, p. 686.

CHIMALTENANGO, a city and the capital of the department of Chimaltenango, southern Guatemala, 25 miles W. of the city of Guatemala. The inhabitants are mostly engaged in handling the products of the district. Population, 4,100. The department has an area of 800 square miles and a population of 61,013, engaged in agriculture and the manufacture of cotton cloths, tissues, woolen goods, hats, baskets, ropes and pottery. Some gold is found by washing the sand of the river-beds.

CHIMBORAZO, a conical peak of the Andes, in Ecuador, 20,517 feet above the sea. The first successful attempt to reach the summit was in 1880, when Whymper twice made the ascent. See ECUADOR, Vol. VII, p. 645.

CHIMERE, a bishop's upper robe, to which the lawn sleeves are attached. That of Anglican bishops is of black satin, that of Roman Catholics is of purple silk.

CHIMMESYANS OR TSIMSIANS, Indians. A tribe of Indians in British Columbia, estimated to number 5,000. They resemble the natives of southern Alaska in many particulars, are expert fishermen, but indifferent hunters, and reside in wooden houses, similar to the Alaskan Indians. "Potlatch," or the giving of great feasts, is one of their customs.

CHIMNEY. See BUILDING, Vol. IV, p. 466; STEAM-ENGINE, Vol. XXII, pp. 496–500.

CHIMPANZEE. See APE, Vol. II, pp. 149, 150.

CHIMU OR GRAN CHIMU, an ancient city of northwestern Peru, on the coast, four miles N. of Truxillo. It was the chief town of the Chimu or Yuncas people. Its ruins are the most extensive in America, covering some 72 square miles, and are from 12 to 15 miles in length. The ruined palaces and temples, immense reservoirs which were filled by an aqueduct 14 miles long, its rich ornaments which have been found among its ruins, show that it was a city of grandeur and importance.

CHINA, the great empire of eastern Asia. (See Vol. V, pp. 626–672.) A statement of its area and population, made in 1896, was as follows:

Subdivision.	Area. English square miles.	Population.
China Proper	1,336,841	386,000,000
Dependencies—		
Manchuria	362,310	7,500,000
Mongolia	1,288,000	2,000,000
Tibet	651,500	6,000,000
Jungaria	147,950	600,000
East Turkestan	431,800	580,000
Total	4,218,401	402,680,000

The island of Formosa was ceded to Japan under the treaty of peace ratified at Chefoo, May 8, 1895, and formally transferred, June 2, 1895. At the end of 1894 the total number of foreigners resident in the open ports of China was 9,350, including 1,294 Americans, 3,989 British and 780 Portuguese. Nearly one half of these resided at Shanghai.

The present sovereign is TSAI'TIEN (emperor) HWANGTI (of China), born in 1871, who succeeded to the throne by proclamation on the death of his predecessor, T'UNG CHI, Jan. 22, 1875. Like his predecessor, he is a grandson of the Emperor TAOU-KWANG. After he became of age, the young Emperor nominally assumed government in March, 1887, but did not take full control until the withdrawal, in February, 1889, of the Empress Dowager, known as the "Western" Empress, widow of T'UNG CHI. He was married Feb. 26, 1889.

The amount of the public revenue of China is not definitely known, but is estimated at from $75,000,000 to $125,000,000. Of the estimate of $75,000,000, the land tax (which does not exceed 75 cents per acre yearly in the north, while it sometimes reaches $3 per acre in the south) is supposed to yield upward of $26,000,000; maritime customs, $13,500,000; inland duty on foreign opium, $3,500,000; inland transit dues, about $9,000,000; native customs, and duty on native-grown opium, $7,500,000; the salt monopoly, $7,500,000; and miscellaneous sources the remainder.

The expenditures of the Chinese government are mainly for the army, and the existing debt has arisen almost entirely out of the war of 1894–95 with Japan. (See JAPAN and COREA, in these Supplements.) At the outbreak of the war, China's outstanding debt was about $2,500,000. It is understood that it now reaches the sum of $265,000,000, three quarters of which is in consequence of payments to Japan of the war indemnity and of the price of the retrocession of the Leao-Tong peninsula.

According to Chinese official statistics, the army is composed of—1. "The Eight Banners," including Manchus, Mongols and the Chinese who joined the invaders under Emperor Sunchih, A.D. 1644, with a total of 323,800, of whom 100,000 are supposed to be reviewed by the Emperor at Peking once a year. 2. "The Ying Ping," or national army, having 650,000 men and 6,500 officers. These figures, however, relate to the year 1892, and it is impossible to obtain reliable information of a later date; but it is understood that great improvements have taken place and that large quantities of foreign-

made arms have been purchased, while the Chinese arsenals, under foreign supervision, are turning out both arms and ammunition. The active army comprises, first, the army of Manchuria, with 70,000 men, divided into two army corps, having their headquarters at Tsitsihar and Moukden, respectively, and to a large extent armed with the Mauser rifle and Krupp eight-centimeter field-pieces; secondly, the army of the center, numbering, in time of peace, 50,000 men, with headquarters at Kalgan, an important town northwest of Peking. These men are of a hardy race, and are armed with Remington rifles. Their number can be doubled in case of war; and thirdly, the army of Turkestan, employed to keep order in the extreme western territories, and probably not available for service farther east in the event of war with a European foe.

The territorial army, or "Braves," is a local militia, capable of being raised to 600,000 men, but kept at 200,000 in time of peace.

The Tatar cavalry of the north, mounted on undersized but sturdy ponies, and wretchedly equipped, are no match for European cavalry.

The Chinese navy, during the war with Japan, disappointed those who regarded it as an effective fighting force. Being required to remain in Chinese waters, it was practically condemned to uselessness. Its seamen were brave, but demoralized under the command of inefficient officers, and in the various engagements of the war a dozen or more vessels were sunk, burned or run ashore. The organization of the fleet in distinct squadrons, severally raised and maintained by the provincial viceroys, operated as a bar to combined action.

The naval strength of China after the war included no battle-ships, 3 port-defense vessels, 7 second-class cruisers, 9 third-class cruisers of 12 knots' speed or more, and 33 of less than that speed; and 7 first-class, 25 second-class and 2 third-class torpedo-boats. There are arsenals or dockyards at Port Arthur, Wei-Hai-Wei, Port Li, Canton and Shanghai.

China is essentially an agricultural country, although no statistics as to its cultivated areas or crops exist. Cereals are raised in the north, rice in the south, tea in the south and west, and the mulberry tree grows in all portions of the country. Opium has become a crop of increasing importance. Coal underlies every province, and the coal-mines at Kai-P'Ing and Hankow have been worked to advantage. There are considerable stores of iron and copper, and copper-mining is an ancient industry in the province of Yünnan, where, however, modern methods are now being employed.

In 1894 the foreign imports amounted to $121,000,000, and the foreign exports to $96,000,000. The imports from Great Britain were $22,500,000, against $7,000,000 from the United States; while the exports to Great Britain were only some $9,000,000, against $12,000,000 to the United States. These figures, however, do not include the trade to and from these countries via Hongkong, which is of considerable extent. The chief imports in 1894 were opium and cotton goods, and the chief exports tea and silk. In the tea trade China has seriously felt the competition of India, Ceylon and Japan in recent years. Japan has been an especially formidable competitor for the American market.

China has an extensive and rapidly increasing telegraphic service, but almost no railways. Peking now has direct overland telegraphic communication with Europe by way of the Amoor valley, Siberia and Russia.

The viceroy, Li Hung Chang, who has been called the Gladstone and the Bismarck of China, has shown a liberal and progressive spirit in adopting for his country, during recent years, many of the improved methods and enlarged ideas of Western civilizations.

CHINA CLAY. See KAOLIN, Vol. XIV, p. 1.

CHINA GRASS. See RHEA FIBRE, Vol. XX, p. 506.

CHINA, GREAT WALL OF. See CHINA, Vol. V, pp. 637, 644.

CHINAMPAS, the floating market-gardens which the Spanish conquerors of Mexico found in great numbers upon the lakes in the vicinity of Montezuma's capital. They were constructed upon masses of grass and weeds, strengthened with poles or piles, and often had a superstructure resembling a house or raft, in which their owners lived. The chinampas were very beautiful, and in time became attached to *terra firma*. Their occupants were Indians, who took the name of Chinampenecs, and were probably of Aztec descent.

CHINANDEGA, a town and the capital of the department of the same name in western Nicaragua; 12 miles from the sea, 18 miles N.W. of Leon. The department is very fertile, and produces large quantities of cotton and sugar, the handling of which is the chief industry of the townspeople. The population in 1888 of the department was 23,719; of the town, 12,500.

CHINA-ROOT. See SARSAPARILLA, Vol. XXI, p. 314.

CHINA SEA. See PACIFIC OCEAN, Vol. XVIII, p. 116.

CHINA WAX. See WAX, Vol. XXIV, p. 459.

CHINCH-BUG (*Blissus leucopterus*), a hemipterous insect common in the Mississippi valley regions, and found in almost every state. Probably no insect causes greater damage to the cereal grains and the grass crops. The mature chinch-bug is three sixteenths of an inch long. The wing-covers are white, with large black spots, and the rest of the body is dark brown. Some of the bugs remain alive during the winter. In the spring the eggs are deposited in the ground. The larvæ suck the sap from the roots of plants. The perfect insects travel from field to field, and destroy the plants in their path. There are two broods in a year, one in early summer and one in autumn. Several infectious diseases are peculiar to the chinch-bug. Within the last five years this fact has furnished the basis of a successful method of preventing their ravages. Bugs artificially infected with one of these diseases are placed in fields where the insects are numerous, and within a few days the disease becomes epidemic. This method of extermination has been applied in several states.

CHINCHILLIDÆ, a family of rodents. See MAMMALIA, Vol. XV, p. 420.

CHINCOTEAGUE BAY AND ISLAND. See ASSATEAGUE, in these Supplements.

CHINDWARA. See CHHINDWÁRÁ, Vol. V, p. 608.

CHINESE EXCLUSION. The Burlingame treaty of 1868 between the United States and China provided for the enjoyment by the Chinese in America of all rights, in respect to travel and residence, accorded to the most favored nation. The experience of the people of this country with Chinese laborers during many years subsequent to the date of that treaty was voiced by a notorious demagogue in the curt dictum, "The Chinese must go"; and in 1880 a new treaty was concluded with China, whereby the government of the United States might suspend, but not absolutely prohibit, their coming to our shores. In accordance with the provisions of this treaty, Congress passed an act in 1882, with amendments in 1884, which suspended the coming of Chinamen to this country for ten years, but which also provided that if Chinamen already here desired to revisit their own country and return here again, they might do so upon certificates of residence, to be obtained from certain officials before their departure, and to be presented by them at their port of arrival when they returned. It was soon discovered that the purpose of the law was being circumvented, and that new immigrants were constantly gaining admission to this country by the fraudulent transfer and use of these certificates, and a law was passed in 1888 which forbade their issuance and declared all outstanding certificates void.

When the exclusion act of 1882 was about to expire, Congress passed an act, approved May 5, 1892, commonly known as the Geary Law, the main provisions of which were that all prior exclusion laws were extended for a further period of ten years, and that all Chinese laborers, or those of Chinese descent, should, within one year, obtain a certificate of residence from the collector of internal revenue in their district; should, by regulation of the Secretary of the Treasury under authority of this act, each prove his identity by registering and filing three proof-sheet photographs of his face; and that all failing to comply with the provisions of this law should be deported from the United States. A fine of one thousand dollars or imprisonment for five years was imposed for altering or substituting a name in a certificate or for forging or fraudulently uttering a certificate. The Chinese generally failed to comply with the provisions of the law within the time limit, and owing to the wholly insufficient appropriations made for carrying it into effect the deportations could not be made. In 1893 an amendment was passed extending the time for registration six months. The total number of Chinese registered under the Geary Law up to 1895 was 105,312. In 1894 a new treaty with China was sent to the Senate March 9th, and ratified August 13th, which prohibits absolutely for ten years the coming of Chinese laborers into the United States, but permits such as depart from this country leaving property or near kin, to return within one year, if, before their departure, they shall have obtained from the proper official of the United States a certificate reciting the facts. Additional time for the return may also be granted in special cases.

CHINESE LANGUAGE AND LITERATURE. See CHINA, Vol. V, pp. 653–667.

CHINESE WHITE, a pigment consisting simply of the oxid of zinc (ZnO). It is prepared by passing air through a burning mixture of zinc ore and coal; the resulting oxid is white, insoluble in water, and incapable of reduction by heat. It has a shiny appearance, and is often used in place of white lead.

CHING-TU, a city of western China, and the capital of the province of Sze-Chuen; on the river Min, about 200 miles N. of its junction with the Yang-Tse River. The city is well laid out, and well built, clean and prosperous. It is surrounded with a wall 12 miles in circumference. The viceroy has his residence here. The surrounding country is very fertile. Population, 800,000.

CHE-KEANG, province. See CHINA, Vol. V, p. 636.

CHINKAPIN, an American Indian name applied to sweet acorns and their allies, and also to the trees which produce them. Probably the original "chinkapin" is *Castanea pumila*, a dwarf chestnut with a solitary nut in each involucre, or "husk." The name is commonly given also to the oak *Quercus prinoides*, also called "dwarf chestnut-oak," as well as to the large "chestnut-oak," *Q. Prinus*. Also written "chinquapin" and "chincapin."

CHINOOK, a wind. See WASHINGTON, Vol. XXIV, p. 385.

CHINOOK OR CHINUK INDIANS, a nearly extinct family of North American Indians, formerly inhabiting the country along the Columbia River from Oregon to Vancouver. They were expert fishermen, subsisting chiefly on fish, berries and roots; were not given to the chase, but secured skins and other articles for clothing by barter with other tribes. They were indolent and thievish, and kept slaves. Only a few scattered families, barely sufficient to keep up tribal relations, remain in parts of Oregon and Washington.

CHINTZ, a certain kind of cotton cloth, printed in a number of colors with a design usually of leaves or flowers, and having the printed surface made smoother than the other by sizing or glazing. Before cotton could be cheaply made, chintz was considered an elegant and tasteful material for ladies' garments. It is now largely used as a summer covering for upholstered furniture and for curtains.

CHIO OR CHIOS, a Greek island. See SCIO, Vol. XXI, p. 465.

CHIPMUNK. See SQUIRREL, Vol. XXII, p. 438.

CHIPPAWA, a village and port of entry of Welland County, southern Ontario, on the Niagara River, three miles above the Falls; noted for the battle of July 5, 1814, between the United States forces under General Joseph Brown and the British under Major-General Riall, in which General Winfield Scott participated and won distinction. The United States troops won a signal victory. General Brown's command numbered about 1,900 men, the British forces some 300 more. The British loss was over 500; the American, 328.

CHIPPEWA FALLS, a flourishing city and rail-

road junction and the capital of Chippewa County, northwestern Wisconsin. It is located on Chippewa River, and on the Wisconsin Central, the Chicago, St. Paul, Minneapolis and Omaha and the Chicago, St. Paul and Milwaukee railroads. The city has water, gas, and electric light works. There are several mills, and lumber is extensively manufactured. Population 1895, 9,196.

CHIPPEWAS. See INDIANS, Vol. XII, pp. 827–831.

CHIPPING–BARNET. See BARNET, Vol. III, p. 379.

CHIPPING–BIRD (*Spizella socialis*), a small North American bird of the sparrow family (*Fringillidæ*). It is also known as chipping-sparrow and chippy.

CHIQUICHIQUI PALM, a native South American name applied to the *Leopoldinia piassaba*, or "piassaba" palm. Its leaf fibers, obtained from the petioles, are extensively used in the northern part of South America for making cables. This fiber has become also an article of commerce.

CHIQUIMULA DE LA SIERRA, a town and the capital of the department of the same name in Guatemala, northern Central America; it is on a tributary of the river Motagua, 68 miles S.S.E. of Guatemala. Population, 9,000.

CHIQUINQUIRA, a city of the department of Boyaca, eastern Colombia, among the eastern Cordilleras, 8,576 feet above the sea. It is famed for an image of the Virgin, reputed to be of miraculous origin. The chapel of this image is considered to be the finest in Colombia, and it is said that 60,000 pilgrims visit it yearly. The region about Chiquinquira is a grazing district. Population, about 12,000.

CHIRIQUI, the name of a lagoon, river and volcano on the Isthmus of Panama. The lagoon is in the country claimed by both Colombia and Costa Rica. It is 90 miles long, 50 miles wide and of sufficient depth for the navigation of any vessels. It has several large islands. The river is part of the boundary claimed by Colombia. It rises in the Cordillera de Chiriqui and flows north to the sea. Its mouth is in lat. 9° N., and long. 82° 30′ W. The volcano is 40 miles southwest of the lagoon, in the above cordillera, 11,260 feet in height.

CHISELHURST, a village in Kent, 11 miles S.E. of London. Sir Nicholas Bacon was a native of Chiselhurst. Camden Park estate (now built over) was the residence of Camden the antiquary. Napoleon III died at Camden Place in 1873; his remains and those of the Prince Imperial were removed to Farnborough in January, 1888. There are here an orphanage and a governesses' benevolent institution.

CHITIN, an organic substance which forms the basis of the hard parts of arthropods and many other invertebrates. It is a nitrogenous non-crystalline compound, allied to the proteids. It is only soluble in strong mineral acids (hydrochloric or sulphuric). In the crustaceans and insects it is seen in a quite pure condition at the joints of the body and appendages, but elsewhere it is impregnated with mineral salts, forming a hard substance.

CHITON, a family of gasteropods. See MOLLUSCA, Vol. XVI, pp. 641–644.

CHITON. See COSTUME, Vol. VI, p. 453.

CHITRAL, a district of Afghanistan. See KASHGAR, Vol. XIV, p. 11, and AFGHANISTAN, in these Supplements.

CHITTAGONG–WOOD, a name somewhat vaguely used by cabinet-makers; usually the wood of *Chickrassia tabularis*, a tree of the family *Meliaceæ*, a native of the mountainous countries to the east of Bengal. It is often beautifully veined and mottled.

CHITTENANGO SPRINGS OR WHITE SULPHUR SPRINGS, a resort in Sullivan township, Madison County, central New York, four miles S. of Chittenango station, on the New York Central and Hudson River railroad. There are accommodations for a large number of visitors in the vicinity. The springs are a sulphated saline solution.

CHITTENDEN, RUSSELL HENRY, an American physiological chemist, a graduate of Yale and Heidelberg universities; born at New Haven, Connecticut, Feb. 18, 1856; has been instructor and professor at Yale for many years; is a member of the National Academy of Sciences; author of several works based on scientific investigation, and an occasional writer of periodical literature.

CHITTUR, a town of southern India, in the district of Arcot, about 80 miles W. of Madras, on the right bank of the Puni, about 1,100 feet above the sea. Population, 5,572.

CHITTY, JOSEPH, an English lawyer, author and editor of many legal text-books; born in 1776; died in London, Feb. 17, 1843. His works were for many years the highest authority upon the subjects of which they treat, and still constitute the foundation of what is written for instruction in those branches. Among them are his well-known treatise on the *Law of Contracts*, which has run through many editions; *Precedents in Pleading* (1808); *Treatise on Criminal Law* (1816); *Chitty's Blackstone* (1832); *Chitty's Practice of the Law* (1833–38); and many others.

CHIVALRY. See KNIGHTHOOD, Vol. XII, p. 110.

CHIVES. See HORTICULTURE, Vol. XII, p. 281.

CHIVILCOY, a city of southeastern Argentine Republic, on the Western railroad; about 110 miles W. of Buenos Ayres. It is in a rich grazing district, and is well built and clean. Population, 12,000.

CHIZEROTS AND BURINS form one of those peculiar races in France that live isolated in the midst of the rest of the population, and are despised and hated by their neighbors. They are found in the arrondissement of Bourg-en-Bresse, in the department of Ain, and the communes of Sermoyer, Arbigny, Boz and Ozan belong to them. According to tradition they are descended from the Saracens. Although industrious and prosperous, they are held in the utmost contempt and detestation by their peasant neighbors, who are themselves often indolent and destitute. They are looked upon as covetous and malicious.

and scarcely would the daughter of a small farmer or well-to-do day-laborer become the wife of one of them, so that they mostly marry among themselves. From time immemorial they have been field-laborers, cattle-dealers, butchers, and the like.

CHLADNI, Ernst Florens Friedrich, a German scientist, author of *Discoveries on the Theory of Sound* (1787); born in Wittenberg, Saxony, Nov. 30, 1756; died in Breslau, April 3, 1827. He was a pioneer discoverer in the science of acoustics, and was the first to illustrate the theory of vibrations by means of the figures into which free sand upon a vibrating plate of glass or metal groups itself. See also Tuning-fork, Vol. XXIII, p. 619.

CHLADNI'S FIGURES. See Acoustics, Vol. I, p. 113.

CHLAMYDOSAURUS. See Lizard, Vol. XIV, p. 736, 737.

CHLAMYS. See Costume, Vol. VI, p. 456.

CHLORANTHACEÆ, a small group of aromatic and stimulant plants, chiefly tropical, allied to the peppers. *Chloranthus inconspicuus* is the chu-lan of the Chinese, who use it for perfuming teas.

CHLORASTROLITE, a dark green stone of the quartz or agate family; a hydrated silicate of alumina, occurring as an amygdule in a Lake Superior trap formation, and found only at Isle Royale, Lake Superior. It is of a deep green color, radiate (or testudinate) in structure, is extremely hard, very lustrous and chatoyant, and cuts handsomely for jewelry-mounting. It is locally known as the "turtle-back greenstone," from its tortoise-like markings. Fine specimens have a good commercial value.

CHLORATES. See Chemistry, Vol. V, pp. 494, 495.

CHLORIC ACID. See Chemistry, Vol. V, pp. 494, 495.

CHLORINATION PROCESS. See Gold and Gold Mining, in these Supplements.

CHLORITE, an abundant mineral occurring now and again crystallized in minute hexagonal plates, or in aggregates of small leaflets, either singly or disposed in radial groups, which are scattered over the joint surfaces of certain schistose rocks, or may occur in a thin incrustation upon other minerals. It is rather soft, and is easily broken or scratched with a knife. See Mineralogy, Vol. XVI, p. 413.

CHLOROPHANE. See Fluor Spar, Vol. IX, p. 350.

CHLOROPHYLL. See Botany, Vol. IV, p. 87; Physiology, Vol. XIX, p. 52, 53.

CHLOROSIS. See Pathology, Vol. XVIII, p. 375.

CHLOROXYLON. See Satin-wood, Vol. XXI, p. 317.

CHOATE, Joseph Hodges, an American lawyer; born at Salem, Massachusetts, Jan. 24, 1832; was graduated at Harvard College, 1852; became the law partner of William M. Evarts in New York City, 1857, and by reason of his brilliant talents immediately won high rank in the profession, and in 1871 became known to the entire country by his vigorous and successful campaign against the Tweed ring in the New York City government. His forensic triumphs as counsel for General Fitz-John Porter and in other weighty causes brought him fame as the foremost of American advocates. He was president of the New England Club in New York, and of the New York constitutional convention in 1893; and was chiefly instrumental in overthrowing the income tax by an argument before the supreme court of the United States. In January, 1899, he was appointed ambassador to Britain.

JOSEPH H. CHOATE.

CHOATE, Rufus, an American statesman and brilliant advocate; born in Essex, Massachusetts, Oct. 1, 1799; was graduated at Dartmouth College in 1819; studied law with William Wirt, and was admitted to the bar in 1823; was a member of Congress in 1831, and again in 1833, but in 1834 removed to Boston and continued the practice of his profession with distinguished success.

RUFUS CHOATE.

In 1841, when Daniel Webster was called to the Cabinet of President Harrison, Mr. Choate was made his successor in the United States Senate, and while there made a number of able and brilliant speeches upon the issues of the day. In 1845 he resumed the practice of law in Boston, and from that time until his death he was recognized as the foremost advocate at the Massachusetts bar. He also delivered public orations on many important occasions; was a member of the Whig convention at Baltimore in 1852 and of the Constitutional convention of Massachusetts in 1853. He died at Halifax, Nova Scotia, where illness had compelled him to land while on a vacation voyage to Europe, July 13, 1859. His popular qualities as an orator shone forth in personal magnetism and in quaint humor, to which were added a large stock of learning, a musical voice and a gentle and attractive disposition.

CHOIR, in architecture, denotes the portion of a church between the transept and the apse, being the place usually occupied by the seats of the singers. In familiar language the word is also used to denote the company of singers who take part in the church service. Until about a generation ago, church music in the United States was commonly supplied by both male and female voices joined in quartettes, sextettes, etc.; but since the general introduction in the Protestant

Episcopal Church of the English custom of having choral choirs, that innovation has been largely adopted by the congregations of other denominations. In surpliced choirs the soprano and alto parts are usually taken by boys, and the bass and tenor by men. All are drilled by a choir-master, who conducts several "practices" or instructions during the week; the men usually sing gratuitously, while the boys receive a small compensation for each service and practice which they attend. Among the many advantages of surpliced choirs, as these are called, not the least is the good effect which the incidental discipline, instruction and familiarity with Christian worship have upon the boys themselves.

CHOKE-CHERRY, the common name of *Prunus Virginiana*, a small American tree or shrub, with rather dense racemes of white flowers and a dark-red astringent fruit.

CHOKE-DAMP OR FIRE-DAMP. See *Lighting*, under COAL, Vol. VI, p. 72.

CHOKING COIL. See ELECTRICITY, §78, in these Supplements.

CHOLERA. "It is now generally accepted," says Dr. S. T. Armstrong, "that Asiatic cholera is a specific, infectious disease that is caused by the comma bacillus of Koch. It is not contagious in the same sense as smallpox or typhus fever, but in the manner of its propagation is similar to typhoid fever. The premise of a specific infection leads to the conclusion of some definite method of introduction, and the disease is chiefly propagated by the contamination of water used for drinking, cooking and washing, by the contamination of articles of food, and possibly by the superficial inhalation and subsequent swallowing of dust containing the comma bacillus. This latter statement is based on the report of many cases of the disease, the origin of which is explicable by no other tenable hypothesis." In 1892 the United States narrowly escaped a visitation of this dread disease, which, in that year, entered Europe through Russia. Starting from India in the early weeks of the year, it followed the caravan routes, and, crossing the mountains by the Khyber Pass, it visited Cabul and the Afghan cities, reached the northern line of Russian Transcaspian travel, and made its way westward both by the Merv route and also by way of Persia. It passed across and around the Caspian Sea and broke out in Astrakhan, on its European side, at the mouth of Russia's great river, the Volga, whence it made its way up the Volga valley to Nijni-Novgorod, the city of markets and fairs, and from there it went to Moscow, St. Petersburg and the Baltic Sea. From the Baltic Sea it spread to other parts of Europe, and to America, aided by the great emigration of Russian Jews to the United States and elsewhere which was then in progress under the auspices of Baron Hirsch. Arrangements had been made for the transportation of many thousands of these poor people, and even after the cholera had broken out among them, every effort was made to carry out the contract and dump them on American shores, regardless of the danger to millions of American people. The infection was carried to Hamburg and Havre, and thence to various points in Germany, to Paris, and to other Continental cities. Hamburg suffered especially from the plague, and had at one time 5,000 cases. From there, in the fall, it made its passage by emigrant steamers to New York Harbor, where a quarantine of unsparing rigor effectually checked its progress beyond the shores of the lower bay. The United States government temporarily stopped the admission of emigrants, and with the advance of cold weather the disease died out. In 1893 and 1894 cholera again broke out in many places in Europe, but by a strict quarantine its introduction in the United States was prevented. See CHOLERA, Vol. V, pp. 682–684.

CHOLERA INFANTUM, a dangerous disease of children which commences in the intestinal canal and ultimately pervades the entire system. It is most common in children two years of age and under, and more common among children of the poor than of the rich. It usually originates in errors of diet during very hot weather, but an unhealthful atmosphere caused by decay of garbage or by imperfect drainage, or a close, moist, and overheated atmosphere, is often a predisposing cause. Dr. Benjamin Rush characterized this disease as an infantile bilious remittent fever. A withered, weak and senile appearance of the skin is a characteristic symptom in the later stage of the disease, while its earlier manifestations are prostration, vomiting and diarrhœa. See CHOLERA, Vol. V, p. 682.

CHOLESTERIN, a substance ($C^{26}H^{44}O$) crystallizing in leaflets, with a mother-of-pearl luster and a fatty feel. It occurs in the blood and brain, in the yolks of eggs, and in the seeds of buds and plants. It has also been found as a fat occurring in the feathers of birds, and is present, in considerable proportions, in wool. It was, until 1887, regarded as of no value when occurring in feathers and wool, except as a combustible. Liebrich has experimented with it and produced an extremely pliant, soft mass, absorbable by the skin, and capable of being readily incorporated with various medicaments. It is now being manufactured commercially, and has come into general demand as a basis for salves and cosmetics. See also NUTRITION, Vol. XVII, p. 675.

CHONETES, a brachiopod shell found in Palæozoic formations of Europe and America.

CHONOS ISLANDS. See PATAGONIA, Vol. XVIII, p. 352.

CHORAL. See MUSIC, Vol. XVII, p. 85.

CHORAL SERVICE, in the Church of England, and in the Protestant Episcopal Church of the United States of America, service with intoned responses and the use of music throughout, wherever it is authorized. A service is said to be partly choral when only canticles, hymns, etc., are sung; wholly choral when, in addition to these, the versicles, responses, etc., are sung.

CHORAL SOCIETIES. See MUSIC IN AMERICA, in these Supplements.

CHORDATA. See VERTEBRATA, Vol. XXIV, p. 179.

CHOREPISCOPUS. See DEAN, Vol. VII, p. 14.

CHORLEY, HENRY FOTHERGILL, a playwright, musical critic and accomplished man of society; born at Blackley Hurst, Lancashire, England, Dec. 15, 1808; was educated at Liverpool; became musical critic of the *Athenæum* in 1833, and retired from that post in 1868. He also wrote literary reviews and the libretti for new operas, and was the author of one hundred or more songs and three acted dramas. His most attractive works are *Music and Manners in France and Germany* (1841) and *Thirty Years' Musical Recollections* (1862). He died Feb. 16, 1872.

CHOROGI, the native name of a Japanese mint (*Stachys sieboldi*) recently introduced into the United States for its edible tubers.

CHOROID COAT. See ANATOMY, Vol. I, p. 887.

CHORRILLOS, a city of central western Peru, on the Pacific coast, 30 miles below Lima, and connected with it by rail. It is used as a summer resort. The Peruvians were defeated before Chorrillos on Jan. 13, 1881, by the Chileans, losing 5,000 men as prisoners.

CHORUS. See DRAMA, Vol. VII, pp. 403, 404.

CHOSE AND CHOSE IN ACTION. See PERSONAL ESTATE, Vol. XVIII, p. 665.

CHOSEN FRIENDS, ORDER OF. See BENEFIT SOCIETIES, in these Supplements.

CHOUGH. See CROW, Vol. VI, p. 618.

CHOUTEAU, AUGUSTE, an American pioneer; born in New Orleans, Louisiana, in 1739; died in St. Louis, Missouri, Feb. 24, 1829. His brother Pierre was born in New Orleans in 1749; died in St. Louis, July 9, 1849. The young men made a trip northward from their native city in 1763, and passing Ste. Géneviève, Missouri, ascended the river some 60 miles farther and founded a trading-station on the present site of the city of St. Louis, where they permanently settled.

CHRISM, an ecclesiastical term signifying the ointment used by the Roman Catholic and Greek churches in confirmation, baptism, ordinations, consecrations, etc., which, in modern times, is blessed and consecrated at a service called "Missa Chrismatis," on Maunday Thursday. It consists of olive-oil mixed with balm, to which it is the custom of the Greek Church to add spices. The significance of the oil is "fullness of grace," and of the balm, "incorruption."

CHRISOME, an ecclesiastical term signifying the cloth or robe annointed with chrism, laid by the priest upon the child in holy baptism, to signify its regeneration and innocence. As the robe was often used for a shroud in case the child died soon after baptism, the phrase *chrisome-child* came to be applied to such children as died within the month of birth.

CHRISTADELPHIANS, a small religious body which arose in the United States about the middle of the nineteenth century, and who claim to represent the true faith and practice of apostolic times. Dr. John Thomas of Brooklyn, New York, the leading advocate of their views, was born in England in 1805, and died in 1871. They believe that God will raise all who love him to an endless life in this world, but that those who do not love him shall absolutely perish in death; that Christ is the son of God, inheriting moral perfection from the Deity and human nature from his mother; and that there is no personal devil. They insist on the plenary inspiration of the Bible; the real death of Christ as a sacrifice for sin; his resurrection and ascension; and they look for his return to the earth to reign on the throne of David over the converted, and restored twelve tribes of Israel, and all nations. They believe that death is a state of entire unconsciousness, terminated by a corporeal resurrection for those who have become related to Christ through faith and obedience, or are not responsible for his rejection. Those accepted after the judgment reign forever with Christ, over the nations; those rejected die the second death. Communities of Christadelphians exist in the principal towns of Great Britain, Ireland and the United States.

CHRISTIAN II, KING OF DENMARK AND NORWAY, son of King John, and grandson of Christian I; born 1480; died 1559; attained the throne of Denmark, 1513; usurped the throne of Sweden, 1518; and having assembled the nobles and prelates of Stockholm on the occasion of his coronation, had them suddenly arrested and publicly executed. He also massacred a number of the citizens of Stockholm. The occasion is referred to as the "bath of blood," and his crimes have gained for him the name of "Nero of the North." He was expelled from Sweden by Gustavus Vasa in 1522; deposed by his Danish subjects in 1523; and retired to the Netherlands, whence, by the assistance of Charles V, he returned with an army in 1531, and attempted to regain his Danish dominion, but was defeated at the battle of Aggerhus in the next year, and kept in confinement until his death. See SWEDEN, Vol. XXII, p. 747.

CHRISTIAN IV, KING OF DENMARK AND NORWAY, son of Frederick II and Princess Sophie of Mecklenburg; born in Zealand, 1577; succeeded to the throne as a minor, 1588; died in 1648. He assumed the government of the kingdom in 1596; labored earnestly for the improvement of his country, and has been called the ablest of all Danish rulers. His legislative and financial reforms and his patronage of the arts and sciences gained him the affection of his people. In the Thirty Years' War he was beaten by Tilly at Lutter, in 1626, but afterward, in conjunction with Gustavus Adolphus, obtained the treaty of Lübeck in 1629. He has the merit of having laid the foundation of the Danish navy, extended the trade of his subjects to the East Indies, and fitted out several expeditions for the discovery of a northwest passage.

CHRISTIAN VII, KING OF DENMARK AND

NORWAY; born 1749; succeeded his father, Frederick V, in 1766; married Matilda, sister of George III of England; died in 1808. He was a weak-minded ruler, and his son was appointed regent in 1784. For an account of his reign, which was adorned by the fame of Thorwaldsen, the sculptor, and the poets Baggesen and Oehlenschlager, see DENMARK, Vol. VII, p. 87.

CHRISTIAN IX, KING OF DENMARK, born April 8, 1818, fourth son of William, Duke of Schleswig-Holstein; succeeded to the throne in 1863, his predecessor having been the last of the line of Oldenburg, which had held the government for four hundred years. His accession rekindled certain political disputes of long standing, concerning the status of the duchies of Schleswig-Holstein, and he was soon involved in an unequal war with Austria and Prussia, from which he withdrew by releasing all claim to the disputed territory (which amounted to about one third of his dominion), leaving the other contestants to fight for the prize between themselves in a war which ended with the battle of Sadowa in 1866. To obtain money for the reorganization of his army, he desired to sell to the United States, in 1867, the islands of St. Thomas, St. Jean and Ste. Croix of the Antilles. In 1869 he cemented the union of the Scandinavian peoples by the marriage of his eldest son to the only daughter of Charles XV, King of Sweden. As a ruler he has striven for the moral and material improvement of his people, for their increase in personal and religious liberty, and for the removal of feudal encumbrances from their laws. The two legislative houses voted a new constitution in 1866, and in 1874 a new constitution was granted to Iceland upon the thousandth anniversary of its national existence. In 1892 was celebrated with becoming splendor the fiftieth anniversary of the marriage of King Christian with his consort, the Princess Louise of Hesse-Cassel. Among their children are: *Frederick, the Prince Royal; Alexandra, Princess of Wales; George I, King of the Greeks;* and *Dagmar, Dowager Empress of Russia.*

CHRISTIAN IX, KING OF DENMARK.

CHRISTIAN, FREDERICK CHRISTIAN CHARLES AUGUSTUS, PRINCE, a younger son of the late Duke Christian Charles Frederick Augustus of Schleswig-Holstein, who ceded his duchy to Denmark, and brother to Prince Frederick Charles Augustus, whose claims to the sovereignty of that duchy, as against the King of Denmark, were made the pretext for the Schleswig-Holstein War on the part of the German powers; born Jan. 22, 1831; married the Princess Helen Augusta Victoria of England, July 5, 1866; is a general in the British army and a Knight of the Garter, and has held other important honorary and lucrative positions with credit to himself and with the good will of the British public.

CHRISTIAN, HELEN AUGUSTA VICTORIA, PRINCESS, third daughter of Queen Victoria of England; born May 25, 1846; married at Windsor Castle, July 5, 1866, to Prince Frederick Christian Charles Augustus of Schleswig-Holstein; received from the British Parliament on the occasion of her marriage a dowry of $150,000 and an annuity of $30,000. She resides at Cumberland Lodge, Windsor, and has living two sons and two daughters.

CHRISTIAN ALLIANCE, a religious association organized in 1887, with its headquarters at 692 Eighth Avenue, New York City. It was founded by Rev. A. B. Simpson, who has been its president from the date of its organization. Its membership, as described by its founder, "consists of all professing Christians who subscribe to its principles and enroll their names." Its objects are stated to be "wide diffusion of the Gospel in its fullness, the promotion of a deeper and higher Christian life, and the work of evangelization, especially among the neglected classes, by highway missions and any other practical methods." The organization is said to be rapidly extending, especially throughout the United States and Canada. Auxiliary to the parent alliance is the "International Missionary Alliance," with a missionary training-school located at 690 Eighth Avenue, New York City. At the end of 1895 the organization had established 265 missionaries in India, China, Japan, Haiti, and Congo Free State. In New York City special work is done for fallen girls by means of "The Door of Hope," a branch "home" opened by the alliance, at 102 East Sixty-first Street, and another, known as "Door No. 2," in Tappan, New York.

CHRISTIAN COMMISSION, an organization formed at the call of the Young Men's Christian Association in New York City, Nov. 14, 1861, for the purpose of looking after the spiritual and temporal welfare of the volunteer soldiers in the Union army. George H. Stuart, a well-known Christian merchant of Philadelphia, was president of the organization throughout the war; and thousands of the ministers and most active laymen of the churches of the North gave their personal services in connection with the humane work of the commission upon the field of battle, on the march, in camp, and in the hospital.

CHRISTIAN ENDEAVOR, THE UNITED SOCIETY OF, is the headquarters and general bureau of the YOUNG PEOPLE'S SOCIETIES OF CHRISTIAN ENDEAVOR, the first of which was formed at Williston Church, Portland, Maine, Feb. 2, 1881, and which, in April, 1896, had increased to 44,596 societies, with a membership of 2,630,000 in the United States, Canada, Great Britain and missionary lands. The United Society's offices are at 646 Washington Street, Boston, Massachusetts, and is managed by a board of trustees, who represent the chief evangelical denominations, and who meet quarterly. It levies no taxes and assumes

no authority over the Young People's Societies, each of which is in some local church and manages its affairs in its own way. The purpose of the local societies is to promote an earnest and useful Christian life on the part of each member, to increase mutual acquaintance between members, and to train young converts in the practical duties of Christianity. The annual gatherings of the Young People's Societies, held under the auspices of the United Society, have had a phenomenally large attendance, and have done much to increase the popularity of the institution.

CHRISTIAN ERA. See CHRONOLOGY, Vol. V, pp. 712, 713.

CHRISTIAN KNOWLEDGE, THE SOCIETY FOR PROMOTING, is the oldest of a number of great religious associations connected with the Church of England. It was founded in London in 1698, and has for its main objects the establishment of schools, churches and libraries, and the publication and circulation of religious and moral literature. It is still in active operation and publishes a great number of religious and instructive works. It has recently established a training college for schoolmistresses. The society has had a vast development, and within a few years past reported the establishment of 25,000 schools, attended by 1,500,000 children. It sent missionaries to India as early as 1749, and has contributed largely to the endowment of colonial bishoprics.

CHRISTIANS OR CHRISTIAN CONNECTION, the name adopted by a religious denomination in the United States, which originated, in 1793, in a secession from the Methodists of Virginia and North Carolina, led by the Rev. J. O'Kelley, and at first called "Republican Methodists." The name was changed that it might express their renunciation of all sectarianism. They must not be confounded with the "Christian Churches" or "Disciples of Christ." In 1800, or soon after, they received accessions from Baptist churches in Vermont, under Dr. Abner Jones and others, and from Presbyterians in Kentucky. They are widely scattered throughout the United States, and in 1895 had 1,300 churches, 1,380 ministers and 9,500 communicants. Antioch College, Ohio; Lincoln College, Nebraska; Union Christian College at Meron, Indiana; and the Christian Biblical Institute of Stanfordsville, New York, are among their institutions. Their principles make each church an independent body and the Bible their only rule of faith, with every person at liberty to interpret it for himself. Membership is obtained by a simple profession of belief in Christianity. As a rule, they are antitrinitarians and immersionists. They have annual conferences and quadrennial general conventions. Their periodicals are *The Christian Sun* (Suffolk, Virginia), *The Herald of Gospel Liberty* (Newburyport, Massachusetts), and *The Gospel Herald* (Dayton, Ohio.)

CHRISTIANSBURG, a town of Montgomery County, western Virginia, on the Norfolk and Western railroad, about 100 miles S.W. of Lexington. It has a college for young women, an academy, and factories of tobacco and of shoes. Population 1890, 1,176.

CHRISTIANS OF ST. THOMAS. See THOMAS, ST., Vol. XXIII, p. 308.

CHRISTIANSTED. See ST. CROIX, Vol. XXI, p. 160.

CHRISTIAN UNION CHURCHES OR CHRISTIAN UNION CHURCHES OF THE WEST, an organization formed at Columbus, Ohio, in 1863. They have no creed, but assert the oneness of the Church, with Christ as its only head, and the Bible the only rule of faith and practice. Each of their churches is self-governed and "good fruits" are the only condition of membership. They reported 183 ministers, 294 churches and 18,000 communicants in 1894.

CHRISTIE, WILLIAM HENRY MAHONY, astronomer royal, born at Woolwich, England, Oct. 1, 1845; entered Trinity College, Cambridge, 1865; B.A., 1868; M.A., 1871; chief assistant at the Royal Observatory, Greenwich, 1870; astronomer royal of England and director of Greenwich Observatory (1881), in which offices he has been a worthy successor of Sir George B. Airy; was the inventor of a recording micrometer, and of numerous photometric instruments; also the author of a *Manual of Elementary Astronomy* (1875), and of many important papers read before learned societies.

CHRISTINA, the name of two queens regent of Spain. See MARIA CHRISTINA, in these Supplements.

CHRISTISON, SIR ROBERT, Scottish physician and toxicologist; born at Edinburgh, July 18, 1797; died Jan. 23, 1882. In 1819 he proceeded to London and Paris, and in the French capital studied toxicology under the celebrated Orfila. He was, in 1822, appointed professor of medical jurisprudence in the University of Edinburgh, and in 1832 was promoted to the chair of materia medica, which he occupied till 1877, when he retired. He was appointed physician in-ordinary to the Queen in 1848; president of the Edinburgh Royal Society (1868–73); and created a baronet in 1871. Besides contributing papers on various subjects to medical journals. Christison wrote a *Treatise on Poisons* (1829); *Biographical Sketch of Edward Turner, M.D.* (1837); a treatise on *Granular Degeneration of the Kidneys* (1839); and *The Dispensatory: A Commentary on the Pharmacopœias of Great Britain* (1842).

CHRISTLIEB, THEODORE, German theologian; born at Birkenfeld, Würtemberg, March 7, 1833; became minister of a German evangelical congregation in London, and afterward pastor at Friedrichshafen, and since 1868 has been professor of practical theology at Bonn. Among his published works are *Leben und Lehre des Johannes Scotus Erigena* (1860); and *Modern Doubt and Christian Faith* (1870).

CHRISTMAS ISLAND, a large, low atoll in the Pacific Ocean, lat 1° 57′ N., long. 157° 27″ W. It has good anchorage, and is the headquar-

ters of an American guano company.—Another CHRISTMAS ISLAND, annexed to Britain in 1888, lies about 250 miles southwest of Java. It is six miles long by four broad, composed of coral masses piled up on a volcanic substratum, and is partially covered with luxuriant vegetation.

CHRISTOLOGY. From Greek *Χριστος*, Christ, and *λογος*, a treatise. The doctrine of the person of Christ, or a treatise relating to it. The doctrine, as now generally held, was developed slowly. The early Christians usually contented themselves with the employment of Biblical language in regard to the person of Christ, without much attempt to explain it. The Jews and pagans who heard them understood it to teach his deity, and the Jews attacked them for preaching two Gods, and thus contradicting the monotheism of the Old Testament. This led them to a study of the Scriptures, and an effort to construe their statements carefully.

We may divide the history of the doctrine into two main periods, and a third period must be added to embrace the recent labors of theologians in this field.

1. The first period extends from the debate of Justin Martyr with Trypho the Jew, about 140, to the Council of Nicæa, 325, during which the church labored to define the relation of the Logos in Christ to the Father, and incidentally to the Spirit also. Justin, in his debate with Trypho, maintained that "God, before all creatures, begot of himself a certain reasonable power called the glory of the Lord, the Son, the Logos." This generation was at a certain definite period in eternity, and its product, the Logos, was subordinate to the Father, not only in functions, but in nature. Tertullian carried the doctrine much further; he was the first to use the word *trinity*, and to teach that God is a tripersonality in himself. Yet he held that the Logos, though inherent in God, did not become a personal being till the work of creation was to begin, and is always subordinate in nature. To Origen we owe the statement that the Logos is without beginning, and is always personal, and that Christ is "the God-man." Yet he also held that the Logos is inferior to the Father in nature. All the preceding writers maintained that the Logos was generated by an act of the divine will. Thus far had the Christian world advanced in its interpretation of the Scriptures, when the Arian controversy burst upon it, and led it to the conviction, never since shaken, that the Logos is equal to the Father in nature, being of the same numerical substance; that he is generated eternally, and had no beginning; and that he is always generated by the nature of the Father, and not by a determination of the divine will. The doctrine is, in other words, that it is the nature of God to exist as a trinity of persons in a unity of substance.

2. Having defined the teaching of the Bible concerning the relation of the Logos in Christ to the Father, it remained for the Church to define its teaching concerning the relation of the Logos in Christ to the human nature in Christ. There were long and bitter controversies, leading to the condemnation of the doctrine of Apollinaris, that the Logos took the place of the human reason in Christ, leaving only a partial humanity; of the Nestorians, that while there are two complete natures in Christ, the divine and the human, they are united only morally, somewhat like a husband and wife well adapted to each other; of Eutyches, that while the two natures in Christ were originally complete, the human was quickly absorbed by the divine, leaving in fact only the latter, slightly modified by the appropriation of the former; and several other unacceptable theories. The resultant doctrine is, that in Christ the two natures are whole and entire, and so perfectly united as to constitute but a single person.

3. The doctrines of the trinity, and of the relation to each other of the divine and human in Christ, as they were thus early set forth, are now generally held in the Christian world. The second, however, has led to certain difficulties, which some modern writers have sought to remove without disturbing the doctrine itself, so that it is now passing through another stage of development, which promises good fruit.

Until recent times it was taught by theologians in general that the divine nature in Christ did not suffer, since it is impossible for God to suffer. Moreover, the divine nature in Christ retained all its attributes, and continued to perform all its accustomed offices, during the whole of his earthly life and death—his infancy, his childhood, his maturity, his waking, his sleeping, his final unconsciousness on the cross. His divine nature had infinite knowledge, and if his human nature was ever ignorant of anything, there would seem to have been an imperfect union of the two,—a supposition which the creed pointedly excludes. Did Christ, then, only seem to be limited in knowledge, as when he looked for fruit on the barren fig tree? Still further, there are passages of Scripture which lead naturally to the conclusion that the entire being of Christ suffered, like the record of the agony in the garden. There are others which lead to the conclusion that in the incarnation a change took place in the Logos himself, so that the life of Christ was a humiliation, or an "emptying," to use the Greek word of Phil. ii, 6, 7, of the divine nature which he possessed: "Who, being in the form of God, thought it not a thing to be clutched at to be on an equality with God; but emptied himself, and took upon himself the form of a slave."

Considerations such as these led Thomasius to the belief that in the incarnation the Logos so limited himself that he laid aside his omnipotence, omniscience, and omnipresence, and became as fully unconscious as the human nature of the new-born babe; that he gradually grew into the consciousness of his divine nature; that he possessed himself of so much of divine power and knowledge as he needed for the accomplishment of his

mission; that he exposed himself to all the sufferings of life and death; and that, at his ascension, he resumed the full glory of the attributes which he had laid aside. These conjectures, falling on the congenial soil of Germany, so quick to respond to every germinal suggestion, has produced a rich harvest of varied speculations. The theory of Thomasius has not been generally accepted, but neither has it been generally rejected, and an increasing number of theologians are finding themselves in sympathy with it. F. JOHNSON.

CHRISTOPHE, HENRI, KING OF HAITI; born a slave in the West India island of Grenada, Oct. 6, 1767; had purchased his freedom and was employed as an overseer in the island of St. Domingo at the time of the outbreak of the blacks against the French in 1793. He was a man of gigantic stature and great courage, and placing himself at the head of a band of the insurgents, he signalized himself from the commencement of the troubles by his energy, boldness and activity in many bloody engagements. Toussaint L'Ouverture gave him a commission as brigadier-general, and he was largely instrumental in driving the French from the island, which was accomplished in about two years. During the administration of Dessalines, Christophe was general-in-chief, and after Dessalines's death he became President for life, and was master of the northern part of the island. Meanwhile Pétion had organized another republic in Haiti, and a civil war of many years' duration ensued, in which Christophe headed the negroes against the rule of the mulattoes, led by Pétion. In 1811 Christophe had himself proclaimed king of Haiti by the name of Henri I, and also sought to perpetuate his name by the compilation of the Code Henri, a digest founded upon the Code Napoléon. His cruelty finally provoked a revolt which he was unable to quell, and finding himself deserted by his body-guard and all his nobles, he shot himself, Oct. 8, 1820.

CHRIST'S HOSPITAL, popularly known as the Blue-Coat School, from the picturesque dress of the boys educated there, which consists of a blue tunic and yellow breeches and stockings, is situated in Newgate Street, London (occupying the site of the old Greyfriars monastery), and accommodates 700 boys. It was founded by King Edward VI, in 1553, as a hospital for poor orphans and foundlings, but it has gradually become a public boarding-school for the sons of London freemen and Anglican clergymen. It has also a girls' and boys' preparatory school at Hertford, founded in 1683, where there are 120 boys and 350 girls, the boys only coming up to the London school when old enough. In 1890 two day schools, for 600 boys and 400 girls, were opened. The original endowment has been largely increased, notably by King Charles II, and the income amounts to some three hundred thousand dollars per year. The education is essentially classical, but modern languages and literature are also taught. Boys leave the school at 15, except the mathematical scholars and the "Grecians," who are sent on scholarships, either to Oxford or Cambridge. There are about thirty instructors at the London school. The first building was destroyed by the great fire of 1666, and was rebuilt by Sir Christopher Wren. The present one was built by Shaw in 1825. At this institution, Camden, Stillingfleet, Richardson (the novelist), Coleridge, Charles Lamb and Leigh Hunt received their education.

CHROMATIN, the name of one of the constituents of the cell-nucleus. The nucleus in its resting stage is composed of a semi-fluid hyaline substance, and a more solid fibrillar network in which are distributed a number of granules of a substance readily stained, and hence called "chromatin." For illustration, see KARYOKINESIS, in these Supplements.

CHROMATE OF LEAD. See LEAD, Vol. XIV, p. 379.

CHROMATIC PRINTING-PRESS. See PRESSES, in these Supplements.

CHROMATOPHORES. See MOLLUSCA, Vol. XVI, p. 681.

CHROMATYPE, a photographic picture in which the paper employed has been sensitized by some of the salts of chromium.

CHROME STEEL. See IRON AND STEEL, in these Supplements.

CHROMIC ACID. See CHROMIUM, Vol. V, p. 705.

CHROMITE OR CHROMIC IRON. See MINERALOGY, Vol. XVI, p. 386; CHROMIUM, Vol. V, p. 705.

CHROMO-LITHOGRAPHY. See LITHOGRAPHY, Vol. XIV, p. 700.

CHROMOMETER. In the petroleum industry, chromometers are used to determine the colors of oil, and separate it into the commercial grades known as water white, superfine white, prime white, standard white and good merchantable. The Wilson chromometer is much used, but the Stammer chromometer is much more accurate. The latter has a cylindrical case within which is a cylinder with a glass bottom, so arranged that the oil is looked at lengthwise of the cylinder. By turning a screw, the length of this cylinder is altered, and the inspector is able to bring it to a tint matching a sample, and then by noting the length of the column of oil on a scale he finds its color-value in terms of the standard. This chromometer has also been used to test lubricating oils. It has been somewhat improved in detail by Robert Redwood.

A form of chromometer is also used by metallurgists, in assaying, to compare the intensity of the color of the bead, when an ore is fused with borax, with the color given by a known quantity of the metal.

CHROMOSOMES. In nuclear division the fibrillar network (see CHROMATIN) breaks up into a definite number of segments, to which the name *chromosomes* has been given. The movements of these chromosomes during nuclear division are an essential feature of the process. Much interest is attached to chromosomes, as they are claimed by many biologists to be the

material carriers of hereditary tendencies. For illustration, see KARYOKINESIS, in these Supplements, and also see the article on REPRODUCTION in the same.

CHROMOSOMES. See EMBRYOLOGY AND HEREDITY, in these Supplements.

CHROMOSPHERE. See ASTRONOMY, Vol. II, p. 788.

CHRONOGRAM OR CHRONOGRAPH, a whimsical device of the later Romans, by which a date is given by selecting certain letters from among those which form an inscription, and printing them larger than the others. The principle will be understood from the following example, made from the name of George Villiers, first Duke of Buckingham:

GEORGIVs DVX bVCkINGaMIÆ.

The date MDCXVVVIII (1628) is that of the year in which the Duke was murdered by Felton at Portsmouth. Another well-known example conveys the date in the inscription upon a medal struck by Gustavus Adolphus in 1632:

CHrIstVs DVX; ERGO trIVMphVs.

CHRONOGRAPH See GUNNERY (Vol. XI, pp. 297–301) AND BALLISTICS, in these Supplements.

CHRONOSCOPE, an instrument contrived by Sir Charles Wheatstone to measure the duration of certain short-lived luminous phenomena, such as the velocity of light, the electric spark, or the velocity of projectiles, of which the eye itself can be no judge, owing to the persistence of impressions on the eye after the cause of sensation has ceased. The phenomenon is observed by reflection in a mirror in such rapid motion that the image of the luminous object would appear to describe a circular arc, the length of which must be a measure of the duration of the light.

CHRYSALIS. See BUTTERFLIES, Vol. IV, p. 594.

CHRYSANTHEMUM. See HORTICULTURE, Vol. XII, p. 254.

CHRYSELEPHANTINE, sculpture in gold and ivory; a fashion which prevailed in Greece and Asia at an early day. Two celebrated works in these costly materials were the statue of *Athene* in the Parthenon and that of the *Olympian Zeus* in his temple at Elis—masterpieces of Phidias. The exposed portions were done in ivory, the drapery and accessorial enrichments in gold. Upon the statue of *Athene*, 26 feet high, the enormous amount of fifty talents of gold was used.

CHRYSIS, a genus of hymenopterous insects. They are popularly known as "cuckoo-flies" in England, and as "golden-wasps" in Germany. They are remarkable for their brilliant metallic colors.

CHRYSOBALANUS, a genus of trees and shrubs of the family *Rosaceæ*, natives of tropical and subtropical America and Africa. The cocoa-plum (*C. Icaco*) of tropical America produces an edible fruit.

CHRYSOBERYL, sometimes called CYMOPHANE, a valuable gem, very hard, occurring as round pebbles in Brazil and Ceylon, and as fine crystals called alexandrite in the Ural Mountains. An inferior quality occurs in granite at Haddam, Connecticut, and elsewhere in New England and New York. Cat's-eye is a popular name for one variety. See also MINERALOGY, Vol. XVI, p. 386.

CHRYSOCOLLA, copper ore. See COPPER, Vol. VI, p. 347.

CHRYSOLITE. See PERIDOTE, Vol. XVIII, p. 534; MINERALOGY, Vol. XVI, p. 410.

CHRYSOPRASE, a kind of quartz which constitutes a costly variety of chalcedony. It is generally apple-green in color, often extremely beautiful, and highly prized in jewelry, being sometimes set with diamonds and pearls. It is nearly as hard as flint, translucent, and sometimes semitransparent, and occurs in Oregon, California and elsewhere. See MINERALOGY, Vol. XVI, p. 389.

CHRYSOTYPE, a photographic process invented by Sir John Herschel as an embellishment of his well-known "cyanotype," or "blue-print" process. It consists in treating the sensitized paper with a neutral solution of chlorid of gold after the image has appeared, but before washing. This gives a purple tint to the image, which, after being freely washed in water, is then "fixed" with a weak solution of iodid of potassium, which converts any unaltered chlorid of gold into a soluble salt easy to remove by a final washing.

CHUB (*Leuciscus cephalus*). See ANGLING, Vol. II, p. 42; ROACH, Vol. XX, p. 582.

CHUBB, CHARLES, English inventor, who died May 16, 1845. See SAFES, Vol. XXI, p. 144; also LOCK, Vol. XIV, pp. 746, 747.

CHUBUT OR CHUPAT. See PATAGONIA, Vol. XVIII, p. 353.

CHUCK-WILL'S-WIDOW. See GOATSUCKER, Vol. X, p. 711.

CHUDLEIGH, CAPE, on the north coast of Labrador, at the entrance of Hudson Strait, lat. 60° 12′ N., long. 65° 25′ W.

CHUFFUCK, SAMUEL W., inventor; born in Vermont in 1800; died in Utica, New York, June 28, 1875. In 1845 he engaged in the manufacture of telegraph instruments in Utica, and is said to have made the first one. The "pony" sounder and circuit-closer attachment to the key were his inventions. He was also a collector of rare coins.

CHU HI OR CHU HE, a Chinese philosopher and statesman who flourished during the Sung dynasty in the twelfth century. Born A.D. 1130, at Hihchau, in the province of Nganwui, he early became a studious and precocious child, and was an ardent reader of Confucius. When about 24 years old he became a submagistrate, and from that time exhibited such qualities of forethought, careful observation, diligence, and integrity that his suggestions as to the needs of the empire and the welfare of the people were not only received with favor by the emperor, but, on important occasions of famine or pestilence, were asked, and he became a confidential adviser of the government. His public life was marked by industry, force of character and moderation. His name signifies "brilliant vermilion," and was bestowed in child-

hood as being characteristic of great talents; but upon his marriage he adopted the name YUEN HWUI, "original obscurity." His writings were very numerous, and some of them remain in use to this day. He was the best interpreter of the Chinese classics, and a constant inculcator of moral philosophic teachings. *Outlines of General History; Memoirs of Illustrious Ministers; Domestic Ritual, or Rules for the Use of Families; Commentaries on the Dialogues of Confucius; Treatise on the Duties of Children; Commentary on the Diagrams of the Great Extreme; and Youth's Guide for Studying the Book of Changes*, are the titles of some of his works. He died A.D. 1200.

CHU KIANG OR PEARL RIVER, a river of Kwangtung province; rises in the central part of the province, flows southward, past Canton, into the Li Kiang. Its length is about fifty miles. At Canton it is a broad, tidal river; lower down it becomes separated into numerous delta-like outlets.

CHULALONGKORN I, KING OF SIAM, born Sept. 21, 1853; succeeded to the throne of his father, Oct. 1, 1868; died Aug. 16, 1894; was a just and high-minded ruler, a Buddhist, and a scholar. Among the important reforms which he inaugurated were the partial abolition of slavery and the reform of the calendar, by which he established a new astronomical year, to commence April 1st.

CHULPAS, ancient burial towers of the South American Incas. See illustration of ruins, under ARCHITECTURE, Vol. II, p. 451.

CHUMBUL, a river of central India, rising in the Vindhyan Mountains at a height of 1,800 feet above the sea, and entering the Jumna after a generally northeast course of 514 miles. It is subject to sudden floods, and is not navigable.

CHUMASHAN INDIANS, a nearly extinct linguistic stock of North American Indians originating in the Santa Barbara Islands of the Pacific coast of North America, and at one time congregating around the California missions of Santa Barbara, San Luis Obispo, San Buenaventura and their vicinity.

CHUNAM, the Indian name for a very fine kind of quicklime made from calcined shells or from very pure limestone, and used for chewing with betel and for plaster. When chunam is to be used for plaster, it is mixed with fine river sand and thoroughly beaten up with water. A little jaggery (coarse sugar) is also added.

CH'UNG-K'ING, a city of the province of Sz Chuen, western China, on the west bank of the Yang-Tsz, immediately below the point where the Kialing joins it, about seventeen hundred miles from the sea. It is walled, and was built in its present form between 1368 and 1398. It is six hundred miles above the head of navigation, and the intervening part of the river is a series of dangerous rapids, which is only available for transportation when great skill and boats built especially for the purpose are used. The chief exports of the city are silk, salt, wax and tobacco. Population, 250,000.

CHUQUISACA. See SUCRE, Vol. XXII, p. 618.

CHURCH, ALBERT E., an American mathematician; born at Salisbury, Connecticut, Dec. 16, 1807; died at West Point, New York, March 30, 1878. The son of Chief Justice Church of Connecticut, he received an appointment to the Military Academy at West Point from John C. Calhoun, and was a classmate there with Jefferson Davis, graduating first in his class, July 1, 1828. After eight years' service in the Third Artillery, he resigned from the army and was appointed to succeed Professor Davies at the head of the mathematical department of the Military Academy, in which position he served nearly forty years, being pre-eminently distinguished for his personal and scholarly qualities. He received the degree of LL.D. from Yale in 1852 and that of A.M. from Washington, now Trinity, College, Connecticut, and from the University of Pennsylvania, in 1837; was a member of several scientific societies, and the author of *Elements of the Differential and Integral Calculus*, and numerous other well-known mathematical text-books.

CHURCH, ALFRED JOHN, an English clergyman and author; born in London, Jan. 29, 1827; educated at King's College, London, and at Lincoln College, Oxford; graduated 1851; ordained priest, 1853; assistant master at the Royal Institution School, Liverpool, and at the Merchant Taylors' School, London, 1857–70; head master at Henley Grammar School, 1870–72; and Retford Grammar School, 1873–80; Professor of Latin in University College, London, 1880–89; rector of Ashley, Tetbury, Wilts, 1892; published a number of translations from and editions of the Greek and Latin classics, but is best known by a series of volumes in which he sought to make the classics popular with the young, among which were *Stories from Homer; Stories from Virgil; The Story of the Persian War; Stories from Livy.* He also wrote *The Chantry Priest of Barnet; With the King at Oxford; Stories of the Magicians;* and *To the Lions*, a tale of the early church; and translated a number of Tennyson's poems into Latin verse, published under the title *Horæ Tennysonianæ.*

CHURCH, ARTHUR HERBERT, an English chemist; born June 2, 1834; educated at London and Oxford; professor of chemistry in the Royal Academy of Arts and Sciences since 1879; well known as the discoverer of turacin, an animal pigment containing copper, and of several new mineral species, including the only British cerium mineral. Among his writings are *Precious Stones* (1883); *English Earthenware* (1884); *English Porcelain* (1886); and of the *Laboratory Guide for Agricultural Students*, which reached its sixth edition in 1888. He was elected fellow of the Chemical Society in 1856 and of the Royal Society in 1888.

CHURCH, FREDERICK EDWIN, an American artist; born at Hartford, Connecticut, May 14, 1826; began to paint when quite young, and first studied under Thomas Cole at Catskill, New

York. He next made his home in New York, and in 1849 was elected a member of the National Academy. In 1853 and again in 1857 he traveled in South America. His great picture of *Icebergs* was painted after a visit to Labrador, and attracted much attention when exhibited in London in 1863. A journey through the West Indies, Europe and Palestine, made in 1866, furnished the suggestions of some of his greatest works. His best-known piece is *The Great Fall at Niagara* (seen from the Canadian side), which he painted in 1857, and which is now in the Corcoran Art Gallery at Washington, District of Columbia. In 1867 it received a medal of the second class at the Paris Exposition, and it was exhibited elsewhere in Europe. His works include *The Andes of Ecuador* (1855); *Niagara* (1857); *Heart of the Andes* (1859); *Icebergs* (1861); *St. Thomas in the Vale, Jamaica; Niagara from the American Side* (1866); *Damascus* (1869); *Rainy Season in the Tropics, Jerusalem* (1870); *The Parthenon* (1871); *El Kasna Petra* (1872); *Tropical Moonlight* (1874); *Ægean Sea; Valley of Santa Isabel* (1875); *El Ayn* (1876); *Morning in the Tropics* (1877); and many since. He was well represented at the Chicago World's Fair, 1893.

CHURCH, Frederick Stuart, an American painter; born at Grand Rapids, Michigan, 1841; member of the National Academy and of the American Water-Color Society; resides in New York; affected fantastic effects in color; animals and allegories were among his favorite subjects. *Mad as March Hares* and *The Sea Princess* are two of his best-known pictures.

CHURCH, Irving Porter, an American educator; born at Ansonia, Connecticut, July 22, 1851; graduated as civil engineer at Cornell in 1873; continued there as instructor and assistant professor until 1892, when he was appointed professor of applied mechanics. He was the author of several text-books upon engineering, hydraulics and mechanics, among them *Mechanics of Engineering* and *Notes and Examples in Mechanics.*

CHURCH, John Adams, an American mining engineer; born at Rochester, New York, April 5, 1843; a graduate of the School of Mines in New York City; was several years professor in the same institution, and has participated in government surveys of mines in Nevada and elsewhere, and was the author of several practical works on metallurgy, and of a treatise on *The Comstock Lode* (1880).

CHURCH, Richard William, dean of St. Paul's London; born in Lisbon, April 25, 1815; died in Dover, Dec. 9, 1890; passed his early life in Italy; was educated at Oxford, and in 1838 became fellow of Oriel College and an intimate friend of John Henry Newman. He married in 1853, and became rector of Whateley, in Somerset. In 1854 he published *Essays and Reviews*, and took rank as one of the most graceful and scholarly writers of the day. In 1871 he was elected dean of St. Paul's. Before his deanship, as a center of religious life, St. Paul's had practically no existence, being merely a showplace—an architectural monument. Dean Church aroused popular enthusiasm, and before his death he had made St. Paul's the very heart of the religious life of the city of London. He combined two singular elements of attractiveness: he was at once a link with the past and the most widely reverenced ecclesiastical authority of his day. Among his works are university sermons, in a volume entitled *Human Life and its Conditions* (1878); the series of St. Paul's and Oxford sermons, in *The Gifts of Civilization* (1880), and the five St. Paul's sermons forming *The Discipline of the Christian Character* (1885); all profound contributions to religious thought. Other works are his *Life of St. Anselm* (1871), an amplification of two essays in his first volume; *The Beginning of the Middle Ages* (1877); an introduction to the series of *Epochs of Modern History; Dante: An Essay; Spenser* (1879) and *Bacon* (1879), two of the best books in the series of "English Men of Letters"; and a monograph, published after his death, upon *The Oxford Movement.*

CHURCH, Sanford Elias, jurist; born in Milford, Otsego County, New York, April 18, 1815; died in Albion, New York, May 14, 1880. He became a lawyer and settled in Albion, whence he was called to the assembly in 1842. He was district attorney (1846–47); lieutenant-governor from 1851 to 1855; comptroller of the state (1868–69); and member of the state constitutional convention in 1867. In 1870 he was elected chief justice of the court of appeals of the state of New York, and held the office until his death. He was an influential politician of the Democratic party, and was respected for his uprightness and conservatism.

CHURCH-ALE, an obsolete English merry-making church festival, usually held at Easter or at Whitsuntide, with a view to making money for church purposes. Ale and other refreshments, contributed by the parishioners, were on sale in the vicinity of the church, and the festivals, being largely attended, attracted peddlers, jugglers, morris-dancers and other strollers, until the church-ales became very like the modern fairs.

CHURCH CONGRESS, a popular and sucessful organization within the Church of England, which has held annual gatherings since 1861, designed to promote among the clergy and laity a free interchange of views upon practical religious questions of the day. A somewhat similar institution within the Protestant Episcopal Church of the United States was established in 1875, and holds its sessions in the years when the general convention does not meet. It has also met with great favor and accomplished gratifying results.

CHURCH GOVERNMENT. See Erastus, Vol. VIII, p. 518.

CHURCHILL, John Wesley, an American educator; born May 26, 1839; was graduated at Harvard College, 1865, and at Andover Theological Seminary, 1868, where, after being ordained to the ministry, he became professor of elocution, in which capacity he also served Wellesley and

Smith colleges and the Harvard Divinity School. He contributed to the magazines and was associate editor of the *Andover Review*.

CHURCHILL, RANDOLPH HENRY SPENCER, LORD, an English statesman; second son of the sixth Duke of Marlborough, and brother of the seventh duke; born at Blenheim, Feb. 13, 1849; educated at Oxford; entered Parliament in 1874; made his maiden speech in opposition to making Oxford a garrison town, and by his argumentative strength and reckless utterances in debate soon made himself conspicuous in that assembly. In 1880 he became a Tory leader, chief of a political group, small in numbers, but composed of men of mark, known as "the Fourth Party," who were extremely conservative as to religion and statecraft, and caused the Liberals much trouble by their daring and persistent assaults. Churchill likewise assailed the "old" Tory party, and sought to make his clique of "Conservatives" popular by declaring in favor of universal suffrage and other advanced ideas, after the manner of Bismarck. With this design he founded the Primrose League, of which he became president, and which had a large membership throughout England. In 1885 Churchill became Secretary of State for India in the Marquis of Salisbury's first ministry, but the speedy downfall of that administration gave him little time to adjust the Afghan boundary question. In July, 1886, with Salisbury again in power, he became Chancellor of the Exchequer and leader of the House of Commons. He found the finances in great disorder, and sought to put an end to certain administrative abuses, but only succeeded in drawing upon himself the anger of his fellow-workers, especially of Lord Wolseley. He resigned Dec. 23, 1886. He afterward made several trips to the Continent, which excited the curiosity of every government in Europe, notably one to Russia in December, 1887. He sought to bring England into an alliance with the anti-German party in Russia, and he made significant advances to General Boulanger. He figured conspicuously as the promoter of "Democratic Toryism," and sought to create a conservative democracy by enabling farmers to acquire land and workmen to acquire homes. To this end he proposed to make land transfers less costly and less complicated, to suppress entail, and to lessen taxes by diminishing public expenditures. In 1891 he made a journey to South Africa, where he had financial interests, and in the following year published *Men, Mines and Animals in South Africa*. In 1874 he married a daughter of Lawrence Jerome of New York. He died in London Jan. 24, 1895. His *Speeches from 1880 to 1888* have been published in two volumes (1889).

LORD RANDOLPH CHURCHILL.

CHURCHILL FAMILY. See MARLBOROUGH, Vol. XV, p. 553, and in these Supplements.

CHURCHILL RIVER, of Canada, rises between the north branch of the Saskatchewan and the Athabasca, under lat. 55° N., and flows generally northeast through a series of lakes, first as the Beaver, then as the Missinnippi, and finally as the Churchill or English River, to Hudson Bay, which it enters near Fort Churchill, after a course of nearly one thousand miles. It is extensively navigated by canoes, which are conveyed by portage past the largest of the many rapids.

CHURCHING OF WOMEN, a religious usage, prevailing in the Christian Church from an early period, of women, on their recovery after childbearing, going to church to give thanks. It appears to have been borrowed from the Jewish law (Lev. xii, 6), and the earliest express mention of it is in the pseudo Nicene-Arabic canons.

CHURCH JURISDICTION. See ECCLESIASTICAL LAW, Vol. VII, p. 627.

CHURCH OF GOD OR WINEBRENNERIANS, a religious society in the United States, composed largely of Germans, which was formed in the year 1825, by separation from the German Reformed churches at Harrisburg, Pennsylvania, under the leadership of Pastor John Winebrenner. The first congregation was organized in 1829, with no creed or discipline but the Bible, and with the practice of baptism (adults only) by immersion. They practice, as a church ordinance, the washing of one another's feet, in imitation of Christ's washing the feet of his disciples. They are spread over the Western states, but are principally in the Ohio valley. They have a college at Findlay, Ohio. In 1894 they had 450 ministers, 560 churches and 36,000 communicants.

CHURCH RATES, a tax levied in England upon the occupants of parochial lands and houses for the purpose of maintaining the church and its services. The tax is voted in the first instance by the vestry, and must be affirmed by a majority vote of the parishioners. In 1868 an act was passed abolishing compulsory church rates, except such as under that name were applicable to secular purposes.

CHURCHWARDENS, in England, two officers annually elected by the parish to superintend the church, its property and its affairs. In the Protestant Episcopal Church in the United States two churchwardens are annually chosen in each parish, who, with the vestrymen, constitute what is called the vestry of the parish, and have charge of its property and material affairs.

CHURCHYARD BEETLE (*Blaps mortisaga*). See COLEOPTERA, Vol. VI, p. 133.

CHURN. See DAIRY, Vol. VI, p. 770.

CHURUBUSCO, a village of Mexico, six miles S. of the capital. Here, on the 20th of August, 1847, General Winfield Scott, with the United States forces, on his way to the City of Mexico, met the Mexicans under Santa Anna, who were guarding this approach to the city, and completely defeated them. In this battle, and in that of Contreras on the same day, General Scott

captured 3,000 prisoners and 37 field-pieces. The Mexican loss in killed and wounded was 4,000; the total American loss, 1,053.

CHUTNEY, a highly seasoned compound of fruits spices (chiefly mangoes, red pepper and lime-juice) and sugar, made in India, and used in Great Britain and America as a condiment.

CHYLE. See ANATOMY, Vol. I, p. 846.

CHYME. See DIGESTIVE ORGANS, Vol. VII, p. 225.

CIALDINI, ENRICO, DUKE OF GAETA, an Italian statesman and soldier who followed the career of a soldier of fortune through the earlier portion of his eventful life. He was born at Castelvetro di Modena, Aug. 8, 1811, and became a pupil of the Jesuits and a student of philosophy and medicine at the University of Parma; a participant in the Romagnian insurrection of 1831; and after its failure, a refugee in Paris, supporting himself by translating Voltaire and Rousseau into Italian; a soldier in Portugal in 1832–34, serving in the famous Oporto Legion, by means of which Dom Pedro, after a two-years' struggle, succeeded in wresting the crown from his brother Miguel; a soldier in Spain against the Carlists in 1835; a defender of the provisional government of Milan when the revolution of 1848 broke out in Lombardy; a campaigner against Radetzky in 1849; and in 1855 colonel in command of a brigade in the Piedmontese army. At the outbreak of the Crimean War he was commissioned general by the Sardinian government and sent to the field of action, where he played a distinguished part at the battle of Tchernaya. In 1859 he commanded a division of the allied forces of France and Italy against Austria with such success that he was made lieutenant-general. In 1860 he defeated the Papal army at the battle of Castelfidardo, and in 1861 he took Gaeta after a bombardment of 17 days, for which he was created Duke of Gaeta. In the same year he was made field-marshal and appointed viceroy of Naples. In 1864 he became a senator of Italy, and in 1866 and 1868 distinguished himself in the campaigns against Austria and the States of the Church, respectively. The remainder of his life was devoted to affairs of state and diplomacy. He was Italian ambassador at Paris from 1876 to 1881, and was afterward made a general in the Italian army. He died in Leghorn, Sept. 8, 1892.

CIBOL OR SHALLOT. See HORTICULTURE, Vol. XII, p. 288.

CIBORIUM. See ARCHITECTURE, Vol. II, p. 462.

CIBRARIO, LUIGI, Italian historian (1802–70). See POLITICAL ECONOMY, Vol. XIX, p. 387.

CICADA, a large genus of hemipterous insects, famous for their peculiar song, common in many regions of the world. Several species occur in the United States. The adult insects deposit their eggs in the twigs of trees. The larva fall to the ground and burrow. During the larval stages they feed on the juices of the roots of trees. The North American "seventeen-year locust" (*C. septendecim*) lives beneath the ground 17 years, and then emerges to become the perfect insect. Other cicadas spend much less time in the pupa stage. In different areas they appear in different years, so that almost every year is a "cicada year" somewhere. About 16 broods have been traced in the United States, which appear at definite times and places.

CICELY, a name given to several sweet aromatic species of *Umbelliferæ*, notably the *Myrrhis odorata* of Europe, with sweet fruits. In the United States the name is given to the species of the genus *Osmorrhiza*, in which the root is aromatic.

CICUTA OR CONIUM. See HEMLOCK, Vol. XI, p. 646.

CIENFUEGOS, a town of the province of Santa Clara, central Cuba, on the Bahia de Jagua; has railroad facilities and a good port; is the capital of the province. Sugar, molasses, rum and wax are exported in large quantities. Population 1892, 27,430.

CILIATA. See PROTOZOA, Vol. XIX, p. 861.

CIMA, GIOVANNI BATTISTA DA CONEGLIANO, a Venetian painter; born at Conegliano, 1460; died about 1520. He was fond of depicting the saints and the blessed Virgin, and his work is greatly praised by Ruskin for serenity of expression and careful attention to details. Most of his work is found in Venetian churches, but specimens may be seen in the National Gallery, London, and in the gallery of the Louvre. Among his most famous paintings are *St. John the Baptist*, in the Church of the Madonna del Orto, Venice; *Baptism of Christ*, and *St. Helena with the Cross*, both in the Church of St. John, Venice; and *Virgin and Child*.

CIMOLIAN EARTH, a fine white earth found in the island of Cimoli, one of the Cyclades in the Grecian Archipelago, and used by fullers for whitening cloth.

CINCINNATI, one of the great cities of the United States, the capital of Hamilton County, southwestern Ohio, and the chief city of the Ohio valley, had a population of 296,908 by the census of 1890, being an increase of 41,769 inhabitants, or 16.37 per cent over its population in 1880. Its manufactures in 1890 employed a capital of $105,000,000, against $50,000,000 in 1880; and paid $48,000,000 in wages to 97,000 employees during 1890, against $20,000,000 paid to 55,000 employees in 1880. Its manufactories converted $93,000,000 of material into $196,000,000 of product in 1890, against $62,000,000 of material converted into $105,000,000 of product in 1880.

The "Paris of America" and "Queen City of the West," as Cincinnati is popularly called, has become a delightful center of art and music, and a city of rural homes and elegant suburbs. (For its general history and description, see Vol. V, p. 782–784.) Fountain Square, an expansion of Fifth Street, containing the esplanade on which is erected the magnificent fountain designed by Dr. August von Kreling, the son-in-law of Kaulbach, and cast in the Royal Bronze Foundry at Munich, may be called the business center of the

city. The Rookwood Pottery, established in 1880 by Mrs. Storer, a daughter of Joseph Longworth, who founded the Art School, and incorporated in 1890, is one of the notable enterprises of the city, and produces the finest of modern artistic work, true faience ware, made from Ohio valley clays with underglaze ornamentation. Its exhibit at Paris in 1889 received a gold medal above all competitors, and the beauty of its designs is world-famous.

The Art Institute and School have received gifts amounting to over a million dollars, and are the best-endowed in the country. They occupy costly buildings of handsome architecture designed by McLaughlin, situated on the top of Mount Adams, in Eden Park, 350 feet above the Ohio River. The school has a dozen teachers and some five hundred pupils, while the Museum embraces collections of paintings, sculpture, engrav-

ODD FELLOWS' BUILDING, CINCINNATI.

ings, etchings, metal-work, textile fabrics, pottery, American ethnology and archæology of great value. Among the paintings are examples of Calame, Haydon, Lessing, Maratti, Rubens (No. 93), Tiepolo (No. 105), Tintoretto (No. 106), and modern French, German and American masters. Haydon's heroic painting of *The Public Entry of Christ into Jerusalem*, finished in 1820, is in the loan collection, and shows the face of William Hazlitt as St. Peter, that of John Keats as the youthful St. John, and those of Wordsworth, Sir Isaac Newton and the cynical Voltaire among the spectators. The Bookwalter loan collection affords good illustrations of Oriental art, and the art of wood-carving has been revived with a success which rivals the excellence of the best mediæval work. The private art collections of a number of Cincinnati's wealthy citizens have often been described, and contain numerous examples of Lessing, Achenbach, Millet, Gérôme, Kaulbach and other masters.

Cincinnati in its early days was fortunate in receiving a literary, social and educational impetus from a distinguished band of bright and vigorous thinkers, who were among its early settlers. Even Charles Dickens, on the occasion of his first visit to our land, who then found so little to commend in America, was captivated by the air of social refinement which he found here; and the city now has the advantage of numerous institutions for the cultivation of liberal arts and studies which have grown out of the taste and scholarship of its founders. The Literary Club, the University Club, the Historical and Philosophical Society, the Society of Natural History and the Cuvier Club deserve mention. The immense soap manufactory at Ivorydale, the largest in the world, by its system of profit-sharing among its employees gives an object-lesson in the practical application of progressive ideas.

Cincinnati has taken the lead in the popular movement for the development of musical culture. Its College of Music was opened in 1878 and had Theodore Thomas for its president. Its large body of German-born or German-descended citizens gave force and volume to its grand musical festivals, and its fame as a musical center has stimulated its sister cities to similar efforts.

The value of the principal commodities manufactured in Cincinnati during the year 1890 is as follows, expressed in millions of dollars: Boots and shoes, 6; clothing, 17; carriages, 8; furniture, 4; leather, 4; liquors, distilled, 11; liquors, malt, 7; lumber, 3; machinery, 10; packing-house products, 7; saddlery and harness, 4; safes and vaults, 4; soap, 4; tobacco, 3.

The free Public Library contained in 1895 over 200,000 books and pamphlets; the Young Men's Mercantile Library, some 50,000 volumes; and the Law Library, over 8,000 volumes. The Zoölogical Garden, well supplied with animals and birds, situated near the northern limits of the city, covers some 60 acres, its hills and ravines forming a most attractive and picturesque retreat.

CINCINNATI, ORDER OF THE. See COLONIAL SOCIETIES, in these Supplements.

CINCINNATI GROUP OR AXIS. See OHIO, Vol. XVII, p. 734.

CINERARY URNS, urns in which the ashes of the dead were deposited, after the body was burned. Those used by the Greeks and Romans were often of great artistic beauty and were made of marble, glass or pottery-ware. See POTTERY AND PORCELAIN, Vol. XIX, pp. 602, 623.

CINNAMON BEAR, a variety of the common American black bear (*Ursus Americanus*), common in the western United States. It is of a light reddish-brown color.

CINNAMON-STONE, a variety of garnet found in Scotland, Ireland and Ceylon. See JACINTH, Vol. XIII, p. 532.

CINQUE CENTO, an Italian term indicating the style of decorative art and architecture peculiar to the early part of the sixteenth century, when there was an attempt to revert to classical purity of form. The words mean "five hundred,"

a contraction for fifteen hundred, and have reference to the numbers of the years, counting from the Christian era. See ARCHITECTURE, Vol. II, p. 437.

CINQUEFOIL, the common name of the large rosaceous genus *Potentilla*, containing both herbs and shrubs, characterized by the palmately compound leaves, often of five leaflets. The flowers are mostly yellow or purple, and some of them are conspicuous enough to be prized in cultivation. Known also as "five-finger."

CINURA OR THYSANURA. See INSECTS, Vol. XIII, p. 153.

CIPHER. See CRYPTOGRAPHY, Vol. VI, p. 669.

CIRCÆA, a small genus of inconspicuous herbs growing in damp woods, of the family *Onagraceæ*, and commonly known as "enchanter's nightshade." They are delicate, low plants, with opposite thin leaves, very small whitish flowers in racemes, and a small bur-like fruit.

CIRCLE CITY. See ALASKA, *ante*, p. 111*a*.

CIRCLE OF PERPETUAL APPARITION, any circle in the heavens which is parallel to the celestial equator, has the pole-star for its center, and a radius long enough to include in its sweep all the stars which do not pass below the observer's horizon.

CIRCLEVILLE, a flourishing railroad city, the capital of Pickaway County, southern central Ohio, on the Scioto river and Ohio canal; and on the Cincinnati and Muskingum Valley and the Norfolk and Western railroads. It is built on ancient earthworks, which are in the form of a circle and a square. Pork-packing and broom-making are two leading industries. Pop. 1890, 6,556.

CIRCUIT. See TELEGRAPH, Vol. XXIII, p. 122.

CIRCUIT COURT. See UNITED STATES, Vol. XXIII, p. 749.

CIRCUIT COURT OF APPEALS, an intermediate Federal court of appeals created by statute approved March 3, 1891, for the purpose of relieving the pressure on the supreme court. A circuit court of appeals, consisting of one justice of the supreme court and two circuit judges, was created in each circuit. One term each year is held, and by the provisions of the statute the decision of the court of appeals is rendered final, except in certain cases, where serious questions of constitutional law, life and death, or other grave cause, are involved. The object of the statute was also to save expense to litigants and expedite a final judgment.

CIRCULAR POINTS AT INFINITY, two imaginary points at which a right line in the plane of a circle, and infinitely distant therefrom, will be intersected by the circle. See CURVE, Vol. VI, p. 725.

CIRCULATION OF THE BLOOD. See ANATOMY, Vol. I, p. 899.

CIRCULATION OF SAP. See PHYSIOLOGY, Vol. XIX, p. 46.

CIRCUMSTANTIAL EVIDENCE. See EVIDENCE, Vol. VIII, p. 739.

CIRCUMVALLATION, LINES OF, the chain of works surrounding an army engaged in besieging a fortress, facing outward toward the country so as to guard against all attempts at relief by a field army. Redoubts, either isolated or connected by a line of parapet, were much used for this purpose in the sieges of the ancient and middle ages.

CIRCUS. The modern circus is chiefly an exhibition of feats of horsemanship and acrobatic displays, often combined with a menagerie, or collection of wild beasts. Exhibitions of magic, legerdemain and gymnastics are also usually associated with the circus, while probably its most pleasing exhibition is when some bold feats of equestrianism are shown in dramatic setting, such as "Mazeppa's Flight on the Ukraine," or "Dick Turpin's Ride to York." See Vol. V, p. 791; Vol. X, p. 65; Vol. XX, p. 829.

CIRRIPEDIA OR CIRRHIPEDIA, a subclass of degenerated crustacea, including the numerous forms of barnacles and acorn-shells. See CRUSTACEA, Vol. VI, p. 665.

CIRRUS. See METEROLOGY, Vol. XVI, p. 127.

CIRRUS, in botany, signifies a tendril. It is a modified leaf or branch, and is characterized by being filiform and capable of twisting into a spiral about a support. Often spelled "cirrhus," and not in common use.

CIRTA, an ancient city, the capital of the Massylii, in Numidia. After the defeat of Jugurtha it passed into the hands of the Romans, and was restored by Constantine, who named it after himself.

CISALPINE REPUBLIC. After the battle of Lodi in 1796, Bonaparte organized two states, one on the south of the Po, the Cispadane Republic, and one on the north, the Transpadane. In 1797 these two were united into one, under the title of the Cisalpine Republic, which embraced Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona and Rovigo, the duchy of Modena, the principalities of Massa and Carrara, and the three legations of Bologna, Ferrara and the Romagna. The republic was dissolved for a time in 1799 by the victories of the Russians and Austrians, but was restored by Bonaparte after the victory of Marengo, with some modifications of constitution and increase of territory. In 1802 it took the name of the Italian Republic, and chose Bonaparte for its president. In 1805 a deputation from the republic conferred on the Emperor Napoleon the title of King of Italy, after which it formed the kingdom of Italy till 1814.

CISCAUCASIA, that part of the lieutenancy of the Caucasus which lies north of the Caucasus Mountains. It includes the provinces of Kuban, Terek, Tchernomorsk, and Stavropol. Its area is 89,497 square miles; population 1897, 3,786,784.

CISCO, a town and railroad junction of Eastland County, central Texas, on the Texas Central and the Texas and Pacific railroads, about 135 miles S.W. from Dallas, in the center of a fine agricultural region, rich in coal and iron. Population 1890, 1,068.

CISSAMPELOS, a genus of tropical vines of

the family *Menispermaceæ*, of which the most interesting species is *C. pareira* of tropical America, whose root yields the "pareira brava."

CISSEY, Ernest Louis Octave Courtot de, a French general; born in Paris, Dec. 23, 1810; died there, Jan. 15, 1882; graduated from St. Cyr in 1832, became lieutenant-colonel in 1854, and gained his promotion as brigadier-general at the battle of Inkermann; general of division in 1863; had a command in the garrison of Metz, and fought brilliantly in the battles around that stronghold, and afterward led an army corps against the Commune, entering Paris, May 22, 1871; became minister of war, June 5, 1871; resigned Aug. 15, 1876.

CISSOID OF DIOCLES, a curve of the third degree, shaped like an ivy leaf, invented by the Greek geometer Diocles to solve the problem of constructing two mean proportionals between two given lines.

CISTERN. See Building, Vol. IV, p. 503; Sewerage, Vol. XXI, pp. 714 et seq.

CISTUS or ROCK-ROSE, a genus of dicotyledonous plants giving its name to the family *Cistaceæ*, which contains about two hundred known species, chiefly natives of the south of Europe and the north of Africa. Some of them are beautiful evergreen shrubs. From *Cistus Creticus*, *Cistus ladaniferus* and other species, gum ladanum is obtained. The genus *Helianthemum* is the "rock-rose" of the United States, and the "cistus" of England.

CITATION, the act of calling a party into court to answer to an action, to give evidence, or to perform some other judicial act. See Summons, Vol. XXII, p. 642.

CITHARA, an ancient instrument closely resembling the guitar. See Lyre, Vol. XV, p. 114.

CITIZEN, a term applied either specifically to a dweller in a town, or to any one who is either born in the country or has become legally naturalized in it. From the point of view of American constitutional law, a citizen being a member of the political community to which he belongs, every person born in the United States and subject to its jurisdiction (except untaxed Indians) falls within the definition. An alien may become a citizen by being naturalized under the acts of Congress. A citizen of the United States residing in any state of the Union is a citizen of that state. There being a government in each of the several states, as well as a government of the United States, a person may be, and usually is, at the same time a citizen of both, but his rights as a citizen under one of these governments differ legally from those under the other. On the other hand, a person may be a citizen of the United States and not be a citizen of any particular state, having his residence in one of the territories, or not having a fixed residence in any state. Citizenship is not confined to those who have a right to vote, as minors and women are usually citizens without those rights.

In France, during the Revolution, the word *citizen* was adopted by the republicans as the most appropriate term to express the principle of *liberté, égalité et fraternité*. It took the place of *monsieur*. Every Frenchman became *citoyen* in relation to other Frenchmen, the highest in official station being so addressed by the lowest. The usage gradually died out after the assumption of imperial power by Napoleon.

CITIZENSHIP IN THE UNITED STATES embraces the following persons: 1. All individuals born in the United States and not subject to any foreign power (except untaxed Indians). This includes all children of alien parents, other than those of foreign official representatives. 2. All children born elsewhere to fathers who were at the time of their birth citizens resident at some time in the United States. 3. All naturalized persons. 4. Women, though not born in the United States, nor naturalized (if not incapable of naturalization), who are married to citizens. 5. All Indians born within the United States, who have withdrawn from tribal relations, and who are enrolled as taxpayers, or who have accepted lands in severalty under the Congressional act of 1870.

A naturalized citizen is one of foreign birth who has become a citizen by adoption or naturalization. The conditions under and the manner in which an alien may be admitted to citizenship in the United States are described by sections 2165–2174 of the Revised Statutes of the United States. They substantially include the following: The alien must declare, upon oath, before a circuit or district court of the United States, or a district or supreme court of the territories, or a court of record of any of the states having common-law jurisdiction and a seal and clerk, two years, at least, prior to his admission, that it is his intention, *bona fide*, to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign prince or state, and particularly to the one of which he may at the time be subject. He must also declare, on oath, before one of the courts named, "that he will support the constitution of the United States, and that he absolutely and entirely renounces and abjures all allegiance and fidelity to every foreign prince, potentate, state or sovereignty, and particularly, by name, to the prince, potentate, state or sovereignty, of which he was before a citizen or subject," which proceedings must be recorded by the clerk of the court.

If it shall appear to the satisfaction of the court to which the alien has applied that the applicant has resided within the United States continuously for five years, and that during that time "he has behaved as a man of good moral character, attached to the principles of the constitution of the United States, and well disposed to the good order and happiness of the same," he will be admitted to citizenship. If the applicant has borne any hereditary title or order of nobility, he must make an express renunciation of it at the time of his application. Any alien 21 years old and upward who has been in the armies of the United States, and has been honorably discharged

therefrom, may become a citizen, on his petition, without any previous declaration of his intention, provided that he shall have resided in the United States at least one year previous to his application, and is of good moral character. Any alien under the age of 21 years, who has resided in the United States three years next preceding his arriving at that age, and who has continued to reside therein to the time he may make application to be admitted a citizen thereof, may, after he arrives at the age of 21 years, and after he has resided five years within the United States, including the three years of his minority, be admitted a citizen; but he must make a declaration on oath, and prove to the satisfaction of the court, that for two years next preceding it has been his *bona fide* intention to become a citizen. The children of persons who now are or have been citizens of the United States are, though born out of the limits and jurisdiction of the United States, considered as citizens thereof. The naturalization of Chinese is expressly prohibited by section 14, chapter 126, Laws of 1882.

CITRONELLA, a name given to the following products. 1. From the rind of the citron (*Citron, medica*, see Vol. V, p. 795) is prepared a liquid in Barbados, which is used in France to flavor brandy. 2. From a Ceylon grass (*Andropogon schœnanthus*) an oil used by perfumers is exported from the country named. 3. From the common balm (*Melissa officinalis*) a perfume is prepared. The fragrant southernwood (*Artemisia abrotanum*), which is used in France in making beer, is called in that country *citronelle*.

CITRON-WOOD OR CITRUS-WOOD, the most highly prized wood of Roman antiquity, derived from *Biota orientalis*, or from *Callitris quadrivalvis*, allied coniferous trees, natives of Africa and the Orient. It is a very beautiful wood, believed by the Turks to be imperishable, and much used by them for floors and ceilings of mosques.

CITRUS, a genus of the family *Rutaceæ*, trees and shrubs of tropical, subtropical and warm temperate Asia, but many of them now cultivated in all similar climates for their fruit. To it belong the orange, citron, lemon, lime, bergamot, shaddock, etc.

CITTADELLA, a town of central Venetia, northern Italy, 14 miles N.E. of Vicenza, situated on the Brentella, and at the junction of two railroads. It has manufactories of paper and woolen. Population, 8,947.

CITY, an important town. In the United States a city is an incorporated town, usually governed by a mayor, aldermen and common council. In some states ten thousand inhabitants are requisite to the formation of a city government, while in the new states a less number is required, some having incorporated cities of fewer than three thousand inhabitants. In several of the Western states cities are organized under a general law, by which they are designated according to the number of inhabitants, as cities of the first, second and third class. The term *city*, as used in Great Britain, is generally applied to all towns which are incorporated, and which either are or have been sees of bishops. In the case of towns which have grown greatly beyond their original dimensions it is not unusual to give the name of city to the space which they originally occupied; thus we speak of the city of London, in contradistinction to the metropolis, *la cité* of Paris, and similarly of other places.

CITY ISLAND, a city and island of Westchester County, southeastern New York, four miles S. of New Rochelle, in Long Island Sound. It has a number of the public institutions of New York City. Its principal industries are oystering and ship-building. Population 1890, 1,206.

CITY OF REFUGE. The Jewish law set apart six cities, three on each side of the Jordan, as cities of refuge for the unintentional homicide, where he might flee for safety from the avenger of blood. These cities were Bezer, Ramoth-Gilead and Golan on the east, and Hebron, Shechem and Kadesh on the west.

CITY POINT, a port of entry situated at the confluence of the James and Appomattox rivers, in Prince George County, southeastern Virginia. This place was made a supply depot by General Grant in his assaults on Petersburg and Richmond.

CIUDAD REAL, a town of Spain, capital of the province of the same name, whose area is 7,840 square miles; population 1887, 292,291. Situated on a plain between the rivers Guadiana and Jabalon, 105 miles S. of Madrid by rail. It is a poor, dull place, but has a fine Gothic church and remains of the old town walls, with one handsome gateway. There are manufactures, to a small extent, of coarse woolens, linen and table cloths, and a trade in the agricultural produce of the district. Population, 14,702.

CIUDAD RODRIGO, a fortified town of central western Spain, in the province of Salamanca, 17 miles from the Portuguese frontier, and 56 S.W. of Salamanca by rail, on a steep hill above the river Agueda, which is here crossed by a fine bridge. It is a poor, squalid town, chiefly of interest for its sieges during the Peninsular War. Population, 8,330.

CIUDAD VICTORIA, a city and the capital of Tamaulipas, northwestern Mexico, on the Monterey and Mexican Gulf railroad, 295 miles directly N. of Mexico. It is beautifully located in a fertile valley in the Sierra Madre. Sugar-cane is much grown in the neighborhood. Population, nearly 10,000.

CIVIC FEDERATIONS. See LAW AND ORDER SOCIETIES, in these Supplements.

CIVICS, a new word introduced by Dr. Henry Randall Waite, who defined it as follows: "The body of knowledge or science which devotes itself to the consideration of citizenship relations, including the reciprocal relations of government and citizenship." Civics seeks to properly co-ordinate, as parts of an integral science, the essential truths with which the citizen must be familiar. It includes,—1. *Ethics*, defined by Dr. E. Benjamin

Andrews as "the doctrine of duties in society"; in other words, the study and setting forth of the conditions of human character which are essential to the welfare of the citizen, society and government. As right character is the natural source of right action, the science of civics first concerns itself with the facts which underlie and account for these essential characteristics of the good citizen. That the citizen may be qualified to act the part of an intelligent juror in all affairs submitted to the decision of the suffrage, it is essential that he be adequately informed as to other facts in civics, as follows: 2. *Civil Polity.* Government methods and machinery; suffrage rights and obligations; the qualifications and duties of public officials; executive, legislative and judicial affairs; and all other matters having relation to the orderly and proper administration of government.—3. *Law.* The principles and facts of the law in applications most directly involving the interests of society, and especially of the citizen and the government.—4. *Economics.* The principles or laws which explain or control the production, distribution and ownership of that which constitutes or is technically called wealth; the facts relating to the development of natural resources, to manufactures, and to internal and foreign commerce; questions of supply and demand, labor and capital; and matters of like character, considered with reference to their effects upon the citizen, and in their relations to government.—5. *History.* Collateral facts illustrative of tendencies and results growing out of given conditions, considered in connection with ethics, civil politics, law and economics. Civics offers an opportunity for the differentiation of facts hitherto considered within the scope of the sciences which it included, as well as for corresponding exactness in deductions. It differs from what is called social science in general, or sociology, in confining itself to the consideration of sociological facts in their bearings on affairs of citizenship and government.

CIVICS, American Institute of, a national educational institution, with a charter from the United States government. Founded in 1885 by the late Chief Justice Morrison R. Waite and Justice William Strong of the United States supreme court; Noah Porter, late president of Yale University; John Bigelow, Mellen Chamberlain, Theodore W. Dwight, John Jay, Ex-Governor Hugh S. Thompson of South Carolina; General H. B. Carrington, W. E. Sheldon, the late Dr. Alexander Winchell, Henry Randall Waite, General William Preston Johnston of Louisiana; General Joseph R. Hawley, Bishop J. H. Vincent, and other distinguished citizens. Assuming that the voter is a trustee, charged with sacred responsibilities, the institute aims to secure such attention to the facts of civics on the part of all citizens as shall surround the suffrage with the safeguards which grow out of a proper sense of obligations, integrity of purpose, and an adequate degree of intelligence as to affairs in issue. The institute is controlled by 33 trustees, and has auxiliaries, styled "councils," in every state and territory. The immediate direction of its affairs is intrusted to a president and faculty, now numbering 12 members.

CIVIL DAMAGE ACTS, the name given to measures passed in several of the United States, giving to persons who have sustained injury, in person or property or means of support, by any intoxicated person, in consequence of such intoxication, the right of action against the person who sold or gave away the liquor which caused such intoxication. See Liquor Laws, in these Supplements.

CIVIL ENGINEER. See Engineering, Vol. VIII, p. 215.

CIVIL ENGINEERING SCHOOL. See Technical Schools, in these Supplements.

CIVILIS, Claudius. See Germany, Vol. X, p. 478.

CIVILIZATION. See Archæology, Vol. II, p. 342; Anthropology, Vol. II, p. 120.

CIVIL LIST is the annual allowance provided for the use of the sovereign of a constitutional monarchy for the support of the "household" and court. In England the grant is annually voted by Parliament. Previous to the Restoration, in England, all the expenses of the government were defrayed from what was called the royal revenue, which was derived partly from crown lands and partly from other sources, and was at the disposal of the crown. At the Restoration, a distinction arose between the "civil" and the "military" lists, the expenses of the latter being partly defrayed from the crown lands still available, and partly by an annual grant voted by Parliament. During the reign of William III, after the war with France in 1698, the civil list was £700,000, the expenses being for the following: The royal household; the privy purse; the royal palaces; the salaries of the chancellor, judges, great officers of state and ambassadors; the incomes given to the other members of the royal family; the secret-service money, pensions and other irregular claims. On the accession of George IV, the civil list was fixed at £850,000, besides the transference of £255,000 of expenditure to other funds. On the accession of Queen Victoria, the sovereign surrendered the hereditary revenues of the crown for life, receiving in lieu thereof a yearly sum of £385,000, to be devoted solely to the support of her Majesty's household, and distributed as follows: To the Queen's privy purse, £60,000; salaries and expenses of the royal household, £231,260; retiring allowances and pensions to officers, etc., of the household, £44,240; for royal bounties, alms and special services, £36,300; general expenditure of the court, £13,200. This list does not include the annuities to the Prince of Wales, etc., nor other grants made by Parliament to members of the royal family; and besides this sum, the further sum of £1,200 is appropriated for a pension fund for those deserving of recognition on account of their services to the public, or in literature, science or art. The Queen has, also, at her disposal the revenues of the Duchy of Lancaster, £50,000.

The civil list of the Emperor of Austria is $3,875,000; of the Czar of Russia (estimated), $12,000,000; of the King of Prussia, $3,852,770, besides a vast amount of private property, out of which the expenses of the court and royal family are defrayed; of the King of Italy, $2,858,000.

In republics, such as Switzerland, France, the United States, Brazil, etc., there is no civil list of the kind alluded to above. But the term *civil list* has been applied to the list of the entire expenses of the civil government, the revenue appropriated to the support of the same and the officers of the civil government paid from the public treasury. In such a "list" the salary of the President is but a mere item. The salary of the President of Switzerland is $2,700; that of the President of France about $12,000, with an extra allowance of the same amount; of the United States, $50,000.

CIVIL RIGHTS, a term applied to the privileges which are accorded to every citizen by virtue of his citizenship, without regard to race, color or previous condition of servitude. The condition of the colored race in the United States after the abolition of slavery led to the adoption of the fourteenth and fifteenth amendments to the constitution, by which it is provided that "no state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States"; and that the "right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any state, on account of race, color or previous condition of servitude." The words *privileges* and *immunities* have been held to mean such as are of a general nature, as security to life and liberty, the right to acquire property, to have access to courts of justice, and freedom to pursue and obtain happiness and safety, with such restrictions as are necessary to the public good. Whatever guaranties states accord to their own citizens upon these points must be extended to the citizens of other states. The effect of the fifteenth amendment to the constitution in respect of many questions of right in the several states has not been settled by the courts, but the object of that amendment is well understood. It abrogates all state legislation or constitutional provision creating distinctions among citizens of the United States based upon race and color, and prevents the introduction of such distinctions either by the action of the state or by the general government.

CIVIL RIGHTS ACT, an act of the United States Congress, passed in 1875, forbidding the exclusion of any person from the enjoyment of inns, public conveyances, theaters, etc., on account of race or color. Under the provisions of this act, or in some states under state statutes similar in terms, colored citizens have brought suit successfully against hotel-keepers and others refusing them accommodations. The Supreme Court has, however, affirmed the right of a railroad company to provide cars, popularly termed "Jim Crow cars," exclusively for colored citizens, and to require them to travel therein.

CIVIL RIGHTS BILL, an act passed in 1866 by the United States Congress, conferring citizenship upon all persons born in the United States, not subjects of other powers, "of every race and color, and without regard to any previous condition of servitude."

CIVIL SERVICE AND CIVIL SERVICE REFORM. Civil service is the executive branch of the public service, as distinguished from the military and the naval. Under enlightened forms of government it is separated into three branches: Legislative, judicial and the executive.

The legislative branch is essentially representative, and this function of legislators makes their views and interests an important part of the proper test of fitness for the places they seek. But very different considerations should prevail in the selection of clerks and other subordinates, for the reason that secretaries, clerks, copyists, messengers, etc., are in no sense representative. They owe no duty to members of one party that they do not owe equally to the other. Their political views should under no circumstances enter into their work.

The judicial branch of the government is not representative. To make it so in any sense is a prostitution of judicial functions, and a calamity. Justice should be administered alike to every one, at all times and places, without party fear or favor. In the executive department of the United States there are more than one hundred thousand persons occupying responsible clerical positions above the grade of laborers; there are nearly seventy thousand postmasters, with tens of thousands of subordinates, and in all the departments official life is graded from the central authority down to the porters and door-keepers. With rare exceptions, they are doing work the success and the utility of which depend upon its being done wholly on business principles, without any bias of party views. Yet so great was the effort made by parties struggling for power to fill these places with their favorites for the sake of their patronage that gross abuses were practiced.

The same difficulties exist in a monarchical as in a republican form of government. Great Britain discovered the abuses fifty years ago, and required an examination of applicants. The first ones were called *pass* examinations, but rapidly grew into *competitive* examinations. The British precedent was the basis of an act, passed by the United States Congress in 1853, by which such examinations were made the basis of an appointment to any place in the four great classes of clerkships in Washington. These examinations were the first practical steps toward what is designated as Civil Service Reform. See also INDIAN AFFAIRS, in these Supplements.

CIVIL SERVICE RULES. President Grant, in 1872, appointed a "commission" to "devise rules and regulations" for admission to and continuance in the civil service of the United States. The commission prepared and reported such rules,

based upon competitive examinations, and the government officers began at once to carry them out, to some extent. But the political pressure brought to bear upon many of the Senators and members of Congress by their constituents for place and promotion was such that the progress made in the proposed reform was much less rapid than had been expected. In 1879 President Hayes renewed the efforts of President Grant, and the reform was specially observed in the New York post-office and some other large post-offices. Since that date considerable progress has been made, and the system of competitive examinations has been extended, not only to the Federal offices, but also to the civil service in several of the states and chief cities.

The act of Congress prescribing rules and the extent of their application was passed in 1883. It provides for the appointment, by the President, of three Civil Service Commissioners, with a chief examiner, a secretary and other employees, and makes it the duty of the commission to aid the President in preparing rules for carrying the new act into effect; to make regulations for examinations, and for office records and reports, and to provide, also, for the enforcement of the act. The headquarters of the commission is in Washington, District of Columbia. The act prescribed that the President can revise or modify the rules from time to time for the regulation of the service. As revised May 6, 1896, the rules include the following points:

Qualifications for Applicants. Every applicant must be a citizen of the United States, of proper age, mentally and physically sound, of good moral character, or who has not been guilty of a crime or other notorious misconduct, etc. All are otherwise eligible, without respect to political or religious creed, or race.

Branches of the Service. The service includes and is arranged in branches, as follows: The Departmental Service, the Custom-House Service, the Post-Office Service, the Government Printing Service, and the Internal Revenue Service. *The Departmental Service* includes all officers and employees of whatever designation, except persons merely employed as laborers or workmen, and persons who have been nominated for confirmation by the Senate, however or for whatever purpose employed, whether compensated by a fixed salary, or otherwise, who are serving in or on detail from the several executive departments, the commissions and offices in the District of Columbia; the Railway Mail Service; the Indian Service; the several pension agencies; the Steamboat Inspection Service; the Marine Hospital Service; the Lighthouse Service; the Life-Saving Service; the several mints and assay-offices; the Revenue Cutter Service; the force employed under custodians of public buildings; the several subtreasuries; the Engineer Department at large; and all executive officers and employees outside of the District of Columbia, not covered in the above, of whatever designation, whether compensated by a fixed salary, or otherwise, who are serving in a clerical capacity, or whose duties are in whole or in part of a clerical nature; in the capacity of watchman or messenger; in the capacity of physician, hospital steward, nurse, or whose duties are of a medical nature; in the capacity of draftsman, civil engineer, steam-engineer, electrical engineer, computer or fireman; or who are in the service of the Supervising Architect's Office in the capacity of superintendent of construction, superintendent of repair, or foreman; or in the service of the Treasury Department in any capacity.

The Custom-House Service includes the officers and employees serving in any customs district, whose employees number at present, or may hereafter number, as many as five, who have been, or may hereafter be, classified under the Civil Service Act.

The Post-Office Service includes the officers and employees in any free-delivery post-office who have been, or may hereafter be, classified under the act, the latter occurring whenever a free-delivery system shall be established in any post-office, or when any post-office shall be consolidated with a free-delivery post-office. Similarly, *The Government Printing Service* and *The Internal Revenue Service* include all officers or employees who have been, or may hereafter be, classified under the act. The rules provide for certain employees and positions that shall not be subject thereto, which refer to minor or local offices which require only a portion of the time of the holder; to persons in the military and naval service detailed for civil service duties; to persons employed in the foreign service under the State Department; or any person whose duties are of a quasi military or quasi naval character.

Examinations. The examinations to test the fitness of applicants for positions are of a practical and suitable character, involving such subjects and tests as the commission may direct. The dates of these examinations are such as shall be deemed most suitable for the convenience of applicants and the needs of the service. The board of examiners are appointed from persons in the government service. The examination papers are rated on a scale of 100, and 70 marks or over are considered entitling the candidate to eligibility for appointment. A probationary period of six months is authorized, and vacancies, transfers, employment, appointment and promotion of substitutes, reinstatements, etc., are all controlled by the rules, and applicable to all alike.

Age Limitations. The age limitations for entrance to the different positions in the service are as follows: *Departmental Service:* Page or messenger-boy, from 14 to 18; apprentice (or student), from 16 to 20; printer's assistant and messenger, from 18 upward; positions in Railway Mail Service, from 18 to 35; superintendent, physician, supervisor, day-school inspector and matron, Indian Service, from 25 to 55; all other positions in the Indian Service, from 21 to 45; all other positions, from 20 upward. *Custom-House Service:* Clerk and messenger, from 20 upward; other positions, from 20 upward. *Post-Office Service:* Letter-carrier, from 21 to 40; other positions, from 18 upward. *Government Printing Service:* All positions (male), from 21 upward; all positions (female), from 18 upward. *Internal Revenue Service:* Clerk, from 18 upward; other positions, from 21 upward.

Apportionments of appointments are made among the several states and territories and District of Columbia upon a basis of population, except to appointments in the Government Printing-Office; to the position of printer's assistant, skilled helper and operative in the Bureau of Engraving and Printing; to positions in the post-quartermaster's office, in the pension agency and other local offices in the District of Columbia; and to the positions of page and messenger-boy, and apprentice or student. Vacancies outside the District of Columbia are filled by districts; that is, an eligible shall be certified to vacancy in the district in which he resides.

Non-Competitive Examinations. In pursuance of the provisions of the act, wherever competent persons can be found who are willing to compete, no non-competitive examination are given, except as follows: (*a*) To test fitness for transfer, or for promotion in a part of the service to which promotion regulations have not been applied. (*b*) To test fitness for appointment of Indians as superintendents, teachers, teachers of industries, kindergartners, and physicians in the Indian service at large. The non-competitive examinations of Indians for the positions mentioned shall consist of such tests of fitness, not disapproved by the commission, as may be determined upon by the Secretary of the Interior. A statement of the result of every non-competitive test, and all appointments, transfers or promotions based thereon, shall be immediately forwarded to the commission.

Exceptions from Examination or Registration. The following-named employees or positions which have been, or

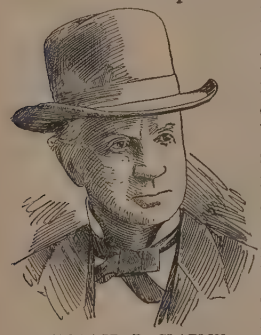
may hereafter be, classified under the Civil Service Act are excepted from the requirement of examination or registration: Private secretaries or confidential clerks (not exceeding two) to the President or to the head of each of the eight executive departments; Indians employed in the Indian service at large, except those employed as superintendents, teachers, teachers of industries, kindergartners and physicians; one cashier in each customs district; one chief or principal deputy or assistant collector in each customs district whose employees number as many as 150; one assistant postmaster, or chief assistant to the postmaster, of whatever designation, at each post-office; one cashier of each first-class post-office when employed under the roster title of cashier only; one cashier in each internal revenue district. As far as possible, all promotions are to be made by competitive examinations. The age limitations are relaxed in the case of persons honorably discharged from military or naval service; and *per centum* of proficiency in examinations of applicants claiming preference under rule 1754 of the Revised Statutes is reduced to 65.

CIVITALI, MATTEO, an Italian sculptor; born at Lucca about 1435. He was a barber until past his thirtieth year, and studied in Florence the art by which he became famous, his master being unknown. His finest works are in the cathedrals at Lucca and Genoa; for the former he executed the altar-piece of St. Regulus, the pulpit, two kneeling angels in the Chapel of the Sacrament, and the *Tempiento*, the octagonal marble shrine for the Volto Santo, the cedar crucifix that was brought to Lucca, miraculously it is said, in A.D. 780. His figure representing *Faith* is preserved in the Uffizi Gallery, Florence. He died in 1501.

CLADOCERA. See CRUSTACEA, Vol. VI, pp. 648, 650.

CLAFLIN, LEE, an American philanthropist; born at Hopkinton, Massachusetts, Nov. 19, 1791; became rich in the manufacture of shoes, using his wealth liberally in the endowment of the Wesleyan Academy, Wilbraham, Massachusetts; the Methodist University, Middletown, Connecticut; and the Boston Theological Seminary. He died Feb. 23, 1871.

CLAFLIN, HORACE BRIGHAM, an American merchant and philanthropist; born at Milford, Massachusetts, Dec. 18, 1811; in 1831 succeeded his father in business, and next year, with his brothers, opened a store in Worcester, Massachusetts. In 1843 Horace removed to New York, and with William F. Bulkeley organized the firm of Bulkeley and Claflin, and began a wholesale dry-goods business, the firm rapidly extending its business; in 1851 it became known as Claflin, Mellen and Company, upon the retirement of Bulkeley. In 1864 Mr. Mellen retired, and the firm became known as H. B. Claflin and Company. The business done by the firm has amounted to $72,000,000 a year. Mr. Claflin was a prominent member of Mr. Beecher's church at Brooklyn, his charities were princely, and he took great delight in assisting promising young men. As early as 1850 he was known as an antislavery advocate. He died at Fordham, New York, Nov. 14, 1885.



HORACE B. CLAFLIN.

CLAGGETT, THOMAS JOHN, an American churchman; born at White's Landing, Maryland, Oct. 2, 1742; was educated at Princeton, where he was graduated in 1762; studied theology, and was ordained in England in 1767. On returning to America he was appointed rector of All Saints' Church, Calvert County, Maryland. On the beginning of the Revolution he retired to his estate in Prince George County; in 1779 began services in St. Paul's parish, and next year became its rector. In 1792 he was consecrated bishop of Maryland, the ceremony taking place in New York, this being the first consecration of a bishop in America, the Scottish and Anglican succession of the Protestant Episcopal Church in America being united in the function. In 1800, during the first session of Congress at Washington, he was chaplain to the Senate. He became rector of Trinity Church, Upper Marlboro, in 1808, which charge he held for the rest of his life. He died at Croom, Maryland, Aug. 2, 1816.

CLAIBORNE, WILLIAM, colonist; born in Westmoreland, England, about 1589; died in Virginia about 1676. He came from a distinguished family, and was appointed, under the London Company, surveyor of the Virginia plantations. In October, 1621, he arrived in Jamestown, and located in James City. Soon afterward he acquired an estate amounting to 45,000 acres. On March 24, 1625, he became secretary of state for the colony, and on March 13, 1628, was commissioned by the governor to make discoveries southward and open trade with the Indians. He settled the Isle of Kent, where he established a trading-post, bought out the interest of all the natives in that island, and induced many settlers to locate on his lands. When Lord Baltimore's first colony arrived at St. Marie's, in March, 1634, they claimed control over the Isle of Kent and all its settlers. The dispute was continued between the two parties for many years, until Virginia, in 1776, released all claims to the territory of Maryland beyond the Potomac River. When Lord Baltimore's colony had been founded on St. Marie's River, trouble began between them and the party of Claiborne, and in course of time the latter's settlement on the Isle of Kent became a failure. Claiborne by that time had become involved in serious difficulties, and in 1637 sailed for England. When the Cromwellian revolution began to make headway in Great Britain, both Maryland and Virginia declared their loyalty to the royal government; but Claiborne saw fit to join the Parliamentary party, and on Sept. 26, 1651, with others, was appointed a commissioner by Parliament to reduce Virginia and the plantations on Chesapeake Bay. An English expedition arrived in Virginia in March, 1652, overthrew the government of the Cavaliers and established a Roundhead one, with Claiborne as sec-

retary of state. See also MARYLAND, Vol. XV, p. 605.

CLAIBORNE, WILLIAM CHARLES COLE, governor of Louisiana; born in Virginia in 1775; died in New Orleans, Louisiana, Nov. 23, 1817. After studying law, he removed to Tennessee, then a territory, where he was elected a judge. He was a member of the convention which prepared the state constitution of 1796, and in 1797 was elected to Congress, where he served two terms. In 1802 he was appointed governor of the territory of Mississippi, and in 1803, when Louisiana was bought from the French, was appointed a commissioner with General James Wilkinson to take possession of the new territory, of which he was made governor in 1804. His administration was especially difficult, owing to the heterogeneous character of the people; but he preserved harmony between creoles and the American planters, and exercised great tact in dealing with the adventurers of Aaron Burr's expedition. When Louisiana was made a state in 1812, he was elected governor, and during the war with Great Britain aided in the defense of his state. In 1816 he was elected to the United States Senate, but was prevented by impaired health from taking his seat. Other members of his family served in Congress at various times.

CLAIBORNE GROUP, a name given in America to certain beds of clay, lignite, shelly sands, and marly limestone which occur in the vicinity of Claiborne, Alabama, and are believed to belong to the Eocene system.

CLAIM. See PATENT, Vol. XVIII, p. 355.

CLAIMS, COURT OF. A court of the United States established by act of Congress, Feb. 24, 1855. It has general jurisdiction of all "claims founded upon the constitution of the United States or any law of Congress, except for pensions, or upon any regulation of an executive department, or upon any contract, expressed or implied, with the government of the United States, or for damages, liquidated or unliquidated, in cases not sounding in tort, in respect of which claims the party would be entitled to redress against the United States, either in a court of law, equity or admiralty, if the United States were suable, except claims growing out of the late Civil War and commonly known as war claims," and certain rejected claims.

It has jurisdiction, also, of claims of like character which may be referred to it by any executive department, involving disputed facts or controverted questions of law, where the amount in controversy exceeds $3,000, or where the decision will affect a class of cases or furnish a precedent for the future action of any executive department in the adjustment of a class of cases, or where any authority, right, privilege or exemption is claimed or denied under the constitution. In all the above-mentioned cases the court, when it finds for the claimant, may enter judgment against the United States, payable out of the public treasury. An appeal, only upon questions of law, lies to the supreme court on the part of the defendants in all cases, and on the part of the claimants when the amount in controversy exceeds $3,000. The findings of fact by the court of claims are final, and not subject to review by the supreme court.

By the act of March 3, 1883, chapter 116, called the Bowman Act, the head of an executive department may refer to the court any "claim or matter," pending in his department, involving controverted questions of fact or law. The court is required to find the facts and its conclusions of law, and to report the same to the department for its guidance and action. The same act authorizes either house of Congress, or any of its committees, to refer to the court any "claim or matter" involving the investigation and determination of facts, the court to find the facts and report the same to Congress for such action thereon as may there be determined. This act is extended by act of March 2, 1887, chapter 359.

There is a statute of limitations which prevents parties from bringing actions on their own motion beyond six years after the cause of action accrued, but the departments may refer claims at any time, if they were pending therein within the six years. The only limitation under the Bowman Act is, that the court shall have no jurisdiction of any claim barred before the passage of the act by any then existing provision of law.

By act of Jan. 20, 1885, Congress gave to the court jurisdiction over "claims to indemnity upon the French government, arising out of illegal captures, detentions, seizures, condemnations and confiscations prior to the ratification of the convention between the United States and the French republic, concluded on the thirtieth day of September, 1800." The time of filing claims is limited to two years from the passage of the act, and all claims not presented within that time are forever barred. The court finds the facts and the law, and reports the same, in each case, to Congress.

By act of March 3, 1891, chapter 538, the court is vested with jurisdiction of certain Indian depredation claims.

There are five judges, who sit together in the hearing of cases, the concurrence of three of whom is necessary for the decision of any case.

The court sits at Washington, District of Columbia, in the Department of Justice Building, 1509 Pennsylvania Avenue, on the first Monday in December in each year, and continues into the following summer, and until all cases ready for trial are disposed of. Cases may be commenced and entered at any time, whether the court be in session or not.

Prior to the establishment of this court, those having claims against the government had no remedy but to petition Congress, and thence to obtain a bill for their relief. This proceeded on the principle of law that no individual can maintain a suit against a sovereign or government unless with the express consent of the proposed defendant. It was the multiplicity of these petitions to Congress which gave rise to the court of

claims, which, it may be stated, is a court of law, devoid of equitable jurisdiction.

CLAIRVAUX, a village in the department of Aube, northeastern France, 10 miles above Bar-sur-Aube, on the left bank of the Aube River. Its celebrated abbey was founded in 1115 by St. Bernard. It is now transformed into a great prison, or house of detention. Population, 1,950.

CLAIRVOYANCE. See SPIRITUALISM, Vol XXII, pp. 404–407; MAGIC, Vol. XV, p. 205.

CLAM, the popular name of various genera of bivalve mollusks, of which the principal are the common hard-shell or little-neck clam (*Venus mercenaria*)—the Indian quahaug—of the Atlantic coast of the United States; the long, soft-shelled clam, or megio, known in England as the cob; the fresh-water clam, which properly belongs to the mussels (*unios*); and the edible giant clam of the South Sea (*Tridacna gigas*) and the Pacific (*Glycimeris generosa*), which bears the largest and most beautiful of bivalve shells.

CLAMATORES, a group of birds now restricted to the *Gallinæ*. The name refers to their crowing or clamoring, which is well illustrated by domestic fowls. The simple singing apparatus, or syrinx, is the chief distinguishing anatomical feature.

CLAN-NA-GAEL, THE. See HOME RULE, in these Supplements.

CLANWILLIAM, a division of the western provinces, north of Cape Town, South Africa, embracing within its area the rich valley of Olifant River West, with a large stretch of mountain and "karroo" on each side. Chief village, Clanwilliam, on Jan Dissels River.

CLAP, THOMAS, an American Congregational minister; born in Scituate, Massachusetts, June 26, 1703, graduated at Harvard in 1722, and preached at Windham, Massachusetts, from 1726 to 1739. In the latter year he was appointed president of Yale College. His learning and other qualities eminently fitted him for the position. He made important improvements in its various departments; he drew up a new code of laws, which were adopted by the trustees, and a new charter, which was granted by the legislature; but his religious views led to his resignation in 1765, and he died in New Haven, Connecticut, Jan. 7, 1767. He was the author of *The Nature and Foundation of Moral Virtue and Obligation* (1765); *History of Yale College* (1766); etc.—THOMAS CLAP, his great-grandfather, came to New England in 1630, and settled in Scituate, Massachusetts, in 1640.

CLAQUE (Fr. *claquer*, "to clap the hands," or "applaud"), the name given, in France, to an institution designed to secure the success of a public performance or production, by bestowing upon it preconcerted applause, thus giving the impression that it is favorably received. The *claque* is of great antiquity, but first became a regularly organized and paid body during the time of Napoleon III, in the famous struggle between Mdlle. Georges and Mdlle. Duchesnois at the Théâtre Français. The performances of the *claqueurs* are directed by a leader, who arranges the points at which applause, laughter or tears are to be forthcoming, and each *claqueur* has a special *rôle* allotted to him. Thus in various parts of the theater are placed *rieurs*, those who laugh at the comic sallies; *pleureurs*, those who weep at pathetic passages; *bisseurs*, who call *bis* or *encore*, and so on; while all occasionally join in hand-clapping and applause.

CLARE, SAINT, an Italian maiden, born in 1193, of a noble family of Assisi; retired in 1212 to the Portiuncula of St. Francis, and in the same year founded the order of Franciscan nuns that bears her name, and which spread rapidly through Europe. She died Aug. 11, 1253. Two years afterward she was canonized by Alexander IV. Her festival falls on August 12th.

CLARE ISLAND. See MAYO, Vol. XV, p 650.

CLAREMONT, a mansion at Esher, Surrey, England, 14 miles S.W. of London; built in 1768, by Lord Clive, at an expense of £100,000, and now the private property of Queen Victoria. It was the residence of the Duke of Albany after his marriage and until his death.

CLAREMONT, a manufacturing town of Sullivan County, southwestern New Hampshire, 48 miles N.W. of Concord. There are cotton, woolen and paper mills; also a water-wheel manufactory The town has a large library and a high school. Population 1890, 5,565.

CLARENCE, an English ducal title, first conferred, in 1362, on Lionel, second son of Edward III and Phillippa. (See YORK, Vol. XXIV, p. 752; EDWARD IV, Vol. VII, p. 685.) This was also the title of Albert Victor, the eldest son of the Prince of Wales, and therefore heir presumptive to the British throne, who was born Jan. 8, 1864, and died Jan. 14, 1892, upon the eve of his contemplated marriage with Princess Victoria Mary of Teck, who was subsequently married to the Duke's younger brother, George Frederick, Duke of York, July 6, 1893.

CLARENCEUX OR CLARENCIEUX, the first of the two provincial kings-of-arms in England; formerly called Surrey or southern king, because his jurisdiction extended over all the country south of the Trent; Norroy being the name of the northern king, whose jurisdiction was over the country to the north of that river. The name of Surrey was changed by Henry V to Clarencieux, in honor of the Duke of Clarence, third son of Edward III. Henry V also instituted a new king-at-arms called Garter, who was made principal king-of-arms, with the two former under him. The duties of Clarencieux are to survey the coats of arms within his province, to register descents and marriages, and to marshal funerals not under the direction of his superior.

CLARENDON, a town and the capital of Monroe County, western central Arkansas, on the Cache River, two miles above its junction with the White, on the Arkansas Midland and the St. Louis, South-Western railroads, 55 miles E. of Little Rock. Its industries are the manufacture of lumber and cotton products. Population 1890, 1,030.

CLARENDON, a small town of Rutland County, southwestern Vermont, on the Otter Creek, and on the Bennington and Rutland railroad, seven miles S. of Rutland; much visited by invalids, on account of its mineral springs, the waters of which are efficacious in skin diseases and kidney complaints. Permanent population, 100.

CLARENDON, CONSTITUTIONS OF, a series of ordinances, sixteen in number, made by a council of the nobility and prelates held at the hunting lodge of Clarendon in 1164, whereby King Henry II checked the power of the church, and greatly narrowed the total exemption which the clergy had claimed from the jurisdiction of the secular courts. They defined the limit of the patronage as well as of the jurisdiction of the pope in England, and provided that the crown should be entitled to interfere in the election to all vacant offices and dignities in the church. See ENGLAND, Vol. VIII, p. 372; HENRY II, Vol. XI, p. 657.

CLARENDON PRESS, publishing branch of the University Press, Oxford, England. In 1672, before the act of 15 George III, chap. 53, which gave universities a perpetual copyright of the works published at their presses, *Clarendon's History of the Rebellion* was issued by the university, the copyright of the work being confirmed to the University by the act. From the proceeds of the first edition of this work the university erected the Clarendon Building, which is used by the Clarendon Press as a publishing department. The issue of Bibles is undertaken by the University Press. See also OXFORD, Vol. XVIII, p. 96.

CLARETIE, JULES, whose real name was ARSÈNE ARNAUD, a French author, born at Limoges, Dec. 3, 1840; while a schoolboy in Paris, he published a novel and became a contributor to the journals. His short story, *Pierrille* (1863), was praised by George Sand, and the novels *Mademoiselle Cachemire* (1865) and *Un Assassin*, renamed later *Robert Burat* (1866), were at once popular. He became one of the most important art and dramatic critics and political writers on the Paris press. During the Franco-German war he acquired the materials for a series of bright and vigorous anti-German books of a historical character, comprising *Histoire de la Révolution de 1870-71* (new ed., 5 vols. 1875–76); *Les Prussiens chez eux* (1872); and *Cinq Ans Après: l'Alsace et la Lorraine Depuis l'Annexion* (1876). He distinguished himself by his conduct during the siege of Paris. His more important later novels are *Madeleine Bertin* (1868); *Le Train 17* (1877); *Monsieur le Ministre* (1881); and *Le Prince Zilah* (1884); *Puyjoli* (1890); *La Cigarette* (1890); etc. He gained a firm footing on the stage through his pictures of the Revolution: *Les Muscadins* (1874); *Le Régiment de Champagne* (1877); and *Les Mirabeau* (1878); and *Petit Jacques* (1885). In 1885 he succeeded M. Perin as director of the Théâtre Français. An English translation of his *Life of Camille Desmoulins* was published in 1876. He is a member of the French Academy (1888), and was promoted to officer of the Legion of Honor (1886).

CLARIFICATION, the process of clearing a fluid from a turpid condition. Natural waters containing much organic matter are clarified by the addition of a little alum, which is precipitated with the organic matter, and the water then becomes healthful and refreshing. An addition of cold water to hot coffee, etc., causes a deposit to be thrown down, which clears the solution.

CLARINDA, a city and the capital of Page County, southwestern Iowa, on the Nodaway River, on the Chicago, Burlington and Quincy and the Humiston and Shenandoah railroads, 62 miles S.E. of Council Bluffs; has a woolen factory and a flour-mill. Population 1890, 3,262.

CLARINET OR CLARIONET. See OBOE, Vol. XVII, p. 708.

CLARION, a city and the capital of Wright County, northern central Iowa, on the Burlington, Cedar Rapids and Northern and the Mason City and Fort Dodge railroads. Wheat, corn, oats and hay are raised in the vicinity. Population, 1,360.

CLARION, capital of Clarion County, central western Pennsylvania, on the Clarion River, and on a branch of the Pittsburg and Western railroad. The village is in the oil region, and the prosperity of the place is much increased thereby. Clarion Seminary is here. Population 1890, 2,164.

CLARK, ABRAHAM, one of the signers of the Declaration of Independence; born in Elizabethtown, New Jersey, Feb. 15, 1726; died in Rahway, Sept. 15, 1794. By profession he was a surveyor and conveyancer and earned the title of "poor man's counselor." He was elected to the Continental Congress, serving from 1776 to 1783, with the exception of 1779, and he had a place in the New Jersey legislature from 1782 to 1787, and from 1787 to 1788 was again in the Continental Congress. Mr. Clark had been called the "Father of the Paper Currency." From 1791 till his death he held a seat in the United States Congress.

CLARK, ALONZO, an American physician; born at Chester, Massachusetts, March 1, 1807; was graduated at Williams College in arts (1823), and took his medical degree at the College of Physicians and Surgeons in New York (1835), where he became professor of physiology and pathology (1848), which he held until 1855, in which year the chair was reconstituted to embrace pathology and practical medicine, Clark holding this chair until 1885. He was dean of the faculty of the college from 1875 to 1885, and was president of the New York State Medical Society. Died in New York City, Sept. 13, 1887.

CLARK, ALVAN, an American optician; born in Ashfield, Massachusetts, March 8, 1804; he was a farmer's son, and became an engraver for calico printworks (1827–36), then a portrait-painter, and from 1845 a manufacturer of telescopes. He was the first in America to make large achromatic lenses. He and his sons associated themselves in this particular business, their first great order being received from the University of Mississippi for an 18-inch object-glass, which, however, went to Chicago. The next glass, 26 inches,

was made for the Naval Observatory at Washington, and was begun in 1870. In 1879 they made a 30-inch glass for the Imperial Observatory at Pulkova; and in 1881 the 26-inch glass for the University of Virginia. Then came the order for the Lick Observatory in California, a 36-inch object-glass, commenced in 1886. Alvan Clark died in Cambridge, Mass., Aug. 19, 1887.—His son, George Bassett (1827–91), at the age of 17 became interested in reflecting-telescopes. He attempted to make a speculum five inches in diameter, until he so interested his father that the two worked together and succeeded in eliminating the chromatic and spherical aberrations and perfecting a working reflecting-telescope. It was to the aptitude of young George that the house of Alvan Clark and Sons owed its origin and much of its success. He became the mechanician of the firm, and to him fell the task of contriving and experimenting, of designing the models and bringing to exactitude the essential optical parts of the great instruments produced by the house.—A second son, Alvan Graham, astronomer, born at Fall River, Massachusetts, July 10, 1832, discovered double stars, was a member of the expeditions which went to Spain to observe the total eclipse of 1870, and to Wyoming eight years later. He received, in 1862, the gold medal from the Academy of Sciences of France for his discovery of the companion star of Sirius. Mr. Clark has invented several improvements in telescopes. In 1894 he completed the 40-inch glass for the University of Chicago, the telescope, which cost $500,000, being located at the Yerkes Observatory, Lake Geneva, Wis. Died at Cambridge, Mass., June 9, 1897.

CLARK, Sir Andrew, Scottish physician; born at Wolfhill, near Coupar-Angus, October 28, 1826, and educated at Aberdeen and Edinburgh. In 1854 he settled in London, where he soon acquired a high reputation. He was president of the Royal College of Physicians, and consulting physician to the London Hospital. He wrote numerous essays, lectures, and reviews, and was Mr. Gladstone's medical attendant. He was created a baronet in 1883, and died in London, Nov. 7, 1893.

CLARK, Charles Edgar, American naval officer, born in Bradford, Vt., Aug. 10, 1843. On Sept. 29, 1860, he was appointed from that state cadet to the Naval Academy, where he remained till 1863. On Oct. 1, 1863, he was made ensign, and in 1863–65 served on the steam-sloop *Ossipee* with the Western Gulf blockading squadron. He was present at the battle in Mobile Bay, Aug. 5, 1864, and at the bombardment of Fort Morgan, at the entrance to the bay, Aug. 23, 1864. In 1865–67 he served on the *Vanderbilt*, on the Pacific station, and obtained his commissions as master (Nov. 10, 1866), and lieutenant (Feb. 21, 1867). In 1867–68 he was on the *Suwanee*, receiving his commission as lieutenant-commander on March 12, 1868. The *Suwanee* was wrecked July 7, 1868. In 1868–69 he was on the receiving-ship *Vandalia*, at Portsmouth, N. H.; after which, in 1869–70, he was with the North Atlantic squadron, first on the *Seminole*, and afterwards on the ironclad *Dictator*. During the next three years he was at the Naval Academy; during which, in 1871, he was with the *Saratoga* on her practice cruise. In 1873–74 he was with the coast-defense monitor *Mahopac*, on the North Atlantic station, and in 1874–77 with the *Hartford*, *Monocacy*, and *Kearsarge*, on the Asiatic station. During the next three years he was at the navy yard, Boston; and in 1881 he was with the training ship *New Hampshire*, being appointed commander on November 15th of that year; and later with the *Ranger* on the North Pacific survey. In 1887–91 he was lighthouse inspector, and in 1893–96 was in command of the *Mohican*. On June 21, 1896, he was made captain, and in 1897 he was in command of the coast-defense monitor *Monterey*. When, early in 1898, war with Spain became imminent, Captain Clark was in command of the first-class battleship *Oregon*, then stationed at Puget Sound. She was ordered to Key West to strengthen the Atlantic squadron. She accordingly left Puget Sound on March 14th, and San Francisco on March 19th, and making her way through the Straits of Magellan, arrived at Jupiter Inlet, Florida, May 24th, having covered the distance from San Francisco, 16,764 miles, in 66 days, or, deducting stoppages for coaling, in 55 days of actual steaming, without accident, thereby accomplishing one of the most remarkable voyages on record. Captain Clark and the *Oregon* did splendid work in the naval battle off Santiago, July 3, 1898, when Cervera's Spanish squadron was destroyed.

CLARK, Daniel, an American Senator; born at Stratham, N. H., Oct. 24, 1809. He graduated at Dartmouth in 1834, studied law, was a member of the assembly five years, served in the United States Senate from 1857 to 1866. In 1861 he moved the resolution expelling the Southern Senators who had left their seats on the secession of their states. He was United States judge for the New Hampshire district. Died in Manchester, N. H., Jan. 2, 1891.

CLARK, Francis Edward, an American churchman; born at Aylmer, Quebec, Sept. 12, 1851; graduated from Dartmouth in 1873, and after a theological course at Andover became pastor of the Williston Congregational Church, Portland, Maine. Here he organized among the young attendants the first Christian Endeavor Society (Feb. 2, 1881). After four years in charge of a church in South Boston, he accepted the presidency of the United Society of Christian Endeavor, and the editorship of the *Golden Rule*, the society's journal (1887).

CLARK, George Rogers, an American general; born in Albemarle County, Virginia, Nov. 19, 1752; died in Locust Grove, near Louisville, Kentucky, Feb. 18, 1818. He began life as a land-surveyor, and commanded a company of militia in Lord Dunmore's war with the Indians. In 1772 he visited Kentucky, and commanded a force of armed settlers there. In 1776 he returned to Kentucky and called an assembly of people at Harrodsburg, June 6, 1776, when Clark and Gabriel Jones were elected to the Virginia assembly. Although not admitted to the legislature, these delegates were received by Patrick Henry and secured the formation of Kentucky. In December, 1777, Major Clark attacked the fort at Kaskaskia, which he captured on July 4, 1778; later he took that of Vincennes.

In December, 1780, he went to Richmond to obtain approval from the authorities for his plans for the capture of Detroit, and while there took a command under Baron Steuben to defend Virginia against an invasion by a British force under Benedict Arnold. In 1781 Clark became brigadier-general. In 1782 he gathered a large force and marched against Indian towns on the Miami and Scioto, five of which were destroyed. He participated in an unsuccessful expedition against the Indians on the Wabash in 1786, and about 1794 he accepted a commission as major-general in the French army to conduct an expedition against the Spanish possessions on the Mississippi; but when Genet, the French minister to the United States, who had given him the commission, was recalled, this was annulled. All of the fertile region northwest of the Ohio river was wrested from the British by the valor of this soldier, yet he died in poverty. The state of Virginia sent him a sword after he became old and poor, but he broke it in pieces, exclaiming, "When Virginia needed a sword, I gave her one. She sends me now a toy. I want bread!"

CLARK, Henry James, an American naturalist; born at Easton, Mass., June 22, 1826; was graduated at the University of New York in 1848 and at the Lawrence Scientific School in 1854, where he was adjunct professor of zoölogy from 1860 to 1863, and afterward held professorships of zoölogy, natural science, and veterinary science. He published *A Claim for Scientific Property* (1863); *Mind in Nature; or, the Origin of Life and the Mode of Development in Animals* (1865); *Lucernariæ and Their Allies* (1878).

CLARK, Horace Francis, an American railroad magnate; born in Southbury, Conn., Nov. 29, 1815; died in New York city, June 19, 1873. After graduating at Williams in 1833 Mr. Clark became a lawyer. He was twice elected to Congress (1856–61) as a Democrat. In 1857 he became director of the New York and Harlem railroad, and afterward was president or director of a number of important roads. He was a manager of the Western Union Telegraph Company; president of the New York Union Trust Company; a successful operator in Wall street; and was one of the citizens who, in 1871, broke the power of the Tweed ring. Commodore Vanderbilt was his father-in-law.

CLARK, Jonas, an American patriot clergyman; born in Newton, Mass., Dec. 25, 1730; died in Lexington, Mass., Nov. 15, 1805. After graduating at Harvard, in 1752, he became pastor of a church in Lexington, where he spent his life. Edward Everett said of Mr. Clark that he "rendered services second to no other in enlightening and animating the popular mind on the great question at issue in Revolutionary times." John Hancock and Samuel Adams were at Clark's house on the night of April 18, 1775, when Paul Revere took his famous ride and warned them, among others, of the danger at hand. These two men asked Mr. Clark if his people would fight. "I have trained them for this very hour; they would fight, and if need be die too, under the shadow of the house of God," he replied. The first blood of the Revolution was shed near his house, April 19, 1775, and when he saw the dead heroes he exclaimed, "From this day will be dated the liberty of the world!"

CLARK, Latimer, an English electrical engineer; born at Great Marlow, Buckinghamshire, March 10, 1822, and at the age of 25 commenced railway engineering with his brother Edwin, in connection with the construction of the Britannia tubular bridge over the Menai Strait, afterward publishing a work thereon, entitled *A Description of the Britannia and Conway Tubular Bridges.* In 1853 he made exhaustive researches on the subject of underground telegraph wires, in which he was the first to discover the fact that currents of low tension travel as fast as high tension currents. In 1859 he became engineer to the Atlantic Cable Company, and in 1860 was a member of the Royal Commission on Submarine Telegraph Cables. In 1861, in a paper read before the British Association, he suggested the names *ohm*, *farad*, and *volt* as electrical units. In 1875 he was elected the fourth president of the Society of Electrical Engineers, and in his address traced the development of the the idea that gave rise to the electric telegraph, and showed that in 1758 a Scotchman named Marshal, or Morrison, of Paisley, had published a clear description of a practicable electric telegraph. Clark originated what is known as "Clark's Standard Cell," and has superintended the submergence of over 50,000 miles of cable in different parts of the world. Among his works are *An Elementary Treatise on Electrical Measurement*, a work that was translated into various languages (1868); *Electrical Tables and Formulæ for Operators in Submarine Cables*, in conjunction with Robert Sabine (1871). His numerous papers, read before scientific societies, are valuable. He was made chevalier of the Legion of Honor. Died Oct. 30, 1898.

CLARK, Thomas March, Protestant Episcopal bishop; born at Newburyport, Mass., July 4, 1812. He graduated at Yale in 1831, studied theology at Princeton, and became a Presbyterian pastor in his native town. Afterward he became an Episcopal clergyman, held rectorates in Philadelphia, Hartford, and twice in Boston. In 1854 he was consecrated second bishop of Rhode Island. He published sermons and addresses, and wrote *Lectures to Young Men on the Formation of Character; The Efficient Sunday-School Teacher;* and *Primary Truths of Religion.*

CLARK, William Smith, educator; born in Ashfield, Mass., July 31, 1826; died in Amherst, March 9, 1886. He graduated at Amherst, and afterward held professorships of chemistry and botany in that college. He served during the war of 1861–65, and two years after its close he became president of the Agricultural College of Massachusetts. In 1876 he went to Japan, pursuing botanical studies; and he introduced into the United States new shade-trees and seeds of foreign plants, which proved of value. He was twice elected to the state legislature; and wrote many papers on botany and chemistry.

CLARKE, Sir Andrew, an English military engineer; born at Southsea in 1824; educated at the Royal Military Academy, Woolwich; entered

the Royal Engineers in 1844, and became lieutenant-general in 1886. He was aide-de-camp and then private secretary to Sir W. Denison, the governor of Tasmania, and afterward served in both houses of the legislature of that colony. In 1853 he was appointed surveyor-general of Victoria, and, entering the assembly, became minister for public lands, but resigned in 1857 and returned to England. In 1863 he was on special service in the Ashantee difficulties, and in 1864 was appointed director of works of the navy, which office he held until 1873. From 1873 to 1875 he was governor of the Straits Settlements, and then minister of public works in India. After a year as commandant of the School of Military Engineering at Chatham he was appointed inspector-general of fortifications (1882).

CLARKE, Charles Baron, an English scientist; born at Andover, Hampshire, June 17, 1832; educated at Trinity and Queen's colleges, Cambridge where he was graduated B.A. in 1856. He was called to the bar at Lincoln's Inn in 1858; was elected fellow of Queen's College, Cambridge, in 1857, and was mathematical lecturer there from 1858 to 1865; entered the Bengal educational service in 1866, and became superannuated in 1887. His works include *Speculations from Political Economy* (1886) and *Class-Book of Geography* (1889). He is a fellow of the Royal and other societies, and gained repute for his studies in botany.

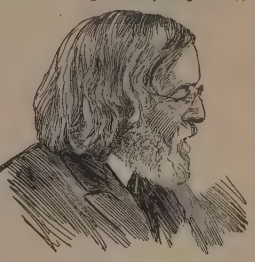
CLARKE, Charles Cowden, and Mary Victoria Cowden, English authors. Charles was born at Enfield, Middlesex, Dec. 15, 1787, and early imbibed a passion for the theater. After his father's death in 1820, he became a bookseller in London, and soon afterward partner as music publisher with Alfred Novello, whose sister (born 1809) he married in July, 1828. The next year Mrs. Cowden Clarke began her monumental task, the *Concordance to Shakespeare's Plays*, published, after sixteen years' toil, in 1845. In 1834 Clarke began a twenty years' course of public lectures on Shakespeare and other dramatists and poets, which brought him much celebrity and profit. In 1859 he published *Carmina Minora*, a volume of original verse, and in 1863 he edited the poems of George Herbert. The joint productions of the pair were an edition of Shakespeare's works, with annotations (1869), *Recollections of Writers* (1878), and the valuable *Shakespeare Key* (1879). In 1856 they went to live at Nice, but removed in 1861 to Genoa, where the husband died, March 13, 1877. Mrs. Clarke alone wrote several novels, volumes of verse and other works, the best known being the *Girlhood of Shakespeare's Heroines* (1850) and *World-Noted Women* (1857). Died in Genoa, Italy, Jan. 12, 1898.

CLARKE, Frank Wigglesworth, an American chemist; born at Boston, Mass., March 19, 1847; graduated at the Lawrence Scientific School of Harvard in 1867; professor of chemistry and physics in Howard University, Washington, D. C. (1873–74), in the University of Cincinnati (1874–83), and then chemist to the United States Geological Survey. He has published *Specific Gravity Tables* (1873); *Weights, Measures and Money of all Nations* (1875); *Tables: Expansion by Heat* (1876). He is an unremitting investigator.

CLARKE, Hugh Archibald, an American musician and composer; born at Toronto, Canada, Aug. 15, 1839; studied under his father and at the Canada University, and took the degree of Mus. D. at the University of Pennsylvania in 1866, becoming professor of music therein in 1875. His works include an oratoria, *Jerusalem*, and a treatise on *Harmony*.

CLARKE, Hyde, English financier and philologist; born in London, Dec. 14, 1815; was employed in England as a civil engineer in the improvement of Morecambe Bay, and next in the promotion of telegraph and railway service in upper India. In 1868 he founded the Council of Foreign Bondholders, whose affairs he administered for some years; and he did much to promote the Anthropological Institute and the Press Fund. His works treat of mythology and comparative philology, especially on the native American languages and their supposed connection with those of the Old World, among them being *The Pre-Hellenic Inhabitants of Asia Minor* (1864); *The Mediterranean Populations, from Autonomous Coins* (1882). Died in London Mar. 1, 1895.

CLARKE, James Freeman, an American clergyman; born at Hanover, New Hampshire, April 4, 1810. He was a grandson of the Rev. James Freeman, pastor of King's Chapel, Boston, who introduced Unitarianism into his congregation. After graduation at Harvard in 1829, and at the Cambridge Divinity School in 1833, he became pastor of the Unitarian Church in Louisville, Kentucky, serving from 1833 till 1840. From 1836 till 1839 he was also editor of the *Western Messenger*, published in Louisville. Returning to Boston he founded, in 1841, the Church of the Disciples, of which he was the pastor until 1886. This became one of the leading religious institutions of Boston, and its service-book includes responses from the congregation, as in the English service, and extemporaneous and silent prayer. From 1867 till 1871 he was professor of natural religion and Christian doctrine in Harvard, and in 1876–77, lecturer there on ethnic religions. He was an overseer of Harvard, a member of the state board of education, and a trustee of the Boston Public Library. With William H. Channing and Ralph Waldo Emerson he prepared the *Memoirs of Margaret Fuller d'Ossoli* (1852). His numerous works include *The Doctrine of Christianity* (1844); *The Doctrine of Atonement* (1845); *Eleven Weeks in Europe* (1852); *Orthodoxy: Its Truths and Errors* (1866); *Self-Culture* (1872); *Christian Doctrine of Forgiveness of Sin* (1874); *Every-Day Religion;* and *Vexed Questions* (1886). He died at Jamaica Plain, Massachusetts, June 8, 1888.



JAMES FREEMAN CLARKE.

CLARKE, JOHN, an American physician; born in Suffolk, England, Oct. 8, 1609; died in Newport, Rhode Island, April 20, 1676. He emigrated to Boston in 1637, and, desiring more religious freedom than the colony afforded, he settled with others in Rhode Island, then called Aquidneck, in 1638. From 1651 to 1664 he was in England, acting as agent for the colony, and secured from Charles II the charter which insured civil and religious liberty for Rhode Island. He is supposed to have drawn up the code of laws which governed the colony. For several terms he was elected to the general assembly, and it is said that he was the first to show, "in an actual government, that the best safeguard of personal right is Christian law." He has been called the "Father of Rhode Island," and also the "Father of American Baptists."

CLARKE, JOHN SLEEPER, comedian; born in Baltimore, Maryland, 1835; studied for the bar, but abandoned it and went upon the stage in his native city and began his regular theatrical career in 1852 in Philadelphia, and was speedily recognized as the best exponent of low comedy then on the boards. He starred the country for years, owned and managed theaters in Philadelphia and in Boston, and from 1867 to 1870, played in London at the St. James and Princess theaters, and in other English cities, with great success. His *Doctor Ollapod; Toodles; Doctor Pangloss;* and *Major Wellington de Boots*, are among his leading creations.

CLARKE, MCDONALD, the "Mad Poet," born in Bath, Maine, June 18, 1798; died in New York City, March 5, 1842. He was an eccentric character, about whose life little was known until he came to New York City in 1819. He was the author of the oft-quoted lines,

> "'Night drew her sable curtain down
> And pinned it with a star.'

Among his publications were the following books: *A Review of the Eve of Eternity, and Other Poems* (1820); *The Elixir of Moonshine, by the Mad Poet* (1822); *The Belles of Broadway* (1836); and *A Cross and a Coronet* (1841).

CLARKE, MARY VICTORIA COWDEN. See CLARKE, CHARLES COWDEN, in these Supplements.

CLARKE, REBECCA SOPHIA, authoress; born in Norridgewock, Maine, Feb. 22, 1833. She has written stories for young people; among her best are *Little Prudy Stories* (1864); *Dotty Dimple Stories* (1868); *Flaxie Frizzle Stories* (1876–84); and *Quinnebasset Girls* (1877). Her pen-name is "Sophie May."

CLARKE, SAMUEL FESSENDEN, an American naturalist; born at Geneva, Illinois, June 4, 1851; was graduated at the Sheffield Scientific School of Yale in 1878; was assistant to the United States Fish Commission in 1874; assistant in the Johns Hopkins biological laboratory, 1879–81; professor of natural science in Williams College (1882); and has published a work, *The Development of a Double-Headed Vertebrate* (1880).

CLARK'S FORK OF THE COLUMBIA OR FLATHEAD RIVER, a stream which drains a part of Montana, Idaho and Washington. It rises in the Rocky Mountains, in western Montana, flows southward through Flathead Lake, and for thirty miles farther, then turns northwest through Lake Pend d'Oreille, and finally reaches the Columbia River. Gold is found near its source.

CLARKSBURG, a town and the capital of Harrison County, northern central West Virginia; situated at the place where the Elk and West Fork rivers unite with the Monongahela, on the Baltimore and Ohio and the West Virginia and Pittsburg railroads. It has flour, woolen and saw mills, electric lights, gas and water works, two academies, fine public buildings, and in the vicinity of the town coke and coal are found. Population 1890, 3,008.

CLARKSON, THADDEUS STEVENS, an American soldier, was born at Gettysburg, Pennsylvania, in 1840. He enlisted April 16, 1861, within two hours after the appearance of President Lincoln's call for seventy-five thousand men for three months, in Company A, First Illinois Artillery. He went to Cairo, served under General Grant there; re-enlisted for the war, July 16, 1861; was promoted Dec. 1, 1861, to adjutant of the Thirteenth Illinois Cavalry; served with that regiment, on the staff of General John W. Davidson, and participated in the battles with that commander on the march to Helena and Little Rock, Arkansas. He was assigned to the command of the regiment during the Arkansas campaign. In August, 1863, he assisted in raising the Third Arkansas Cavalry, composed of Union white men of that state; was promoted to the rank of major, and commanded the regiment until nearly the close of the war, participating in nearly all of the battles in Arkansas, under General Steele. He came to Nebraska, settling in Omaha, with his brother, the late Bishop Clarkson, in March, 1866, and lived in the state for thirty years. He was postmaster of Omaha under President Harrison's administration. Major Clarkson was on the executive committee of the National Council of Administration, Grand Army of the Republic, for three consecutive years; was elected department commander of Nebraska by acclamation at the encampment in February, 1890. He was also commander of the Loyal Legion of Nebraska. He was elected commander-in-chief of the Grand Army of the Republic at the annual encampment at Minneapolis on Sept. 4, 1896.

CLARK'S STANDARD CELL. See ELECTRICITY, § 107, in these Supplements.

CLARKSVILLE, a city and the capital of Montgomery County, northern Tennessee, 50 miles N.W. of Nashville, on the Cumberland River, and on the Louisville and Nashville railroad. Tobacco is manufactured in large quantities. Iron-mines are near the town. It is the seat of the Southwestern Presbyterian University. Population 1890, 7,924.

CLARKSVILLE, the oldest town of northern Texas and the capital of Red River County, in the northeastern part of the state, on the Texas

and Pacific railroad. It has schools and churches, and is the center of a fertile region. Population 1890, 1,588.

CLARK UNIVERSITY, a non-sectarian institution of learning, founded by Jonas C. Clark, in 1887, at Worcester, Massachusetts. The purpose of the university is to give the best post-graduate instruction in a limited number of subjects, mostly scientific, no undergraduates being admitted. The courses offered are in mathematics, physics, chemistry, physiology, morphology, anatomy, neurology, psychology, anthropology and pedagogy, each course being under the supervision of a chief instructor. Ex-

CLARK UNIVERSITY.

aminations are few, and as much liberty is given to the students as possible, the purpose of the institution being to give opportunity for original and individual research under the direction of the instructors. The faculty offers 30 scholarships, valued from $200 to $600 each, in addition to a number of docentships, open to the more advanced students, the holders of which are expected to do some teaching, while giving most of their time to research. There are at present three buildings, one of which, the central building, has 90 rooms; another, the chemistry building, 68 rooms. There are 16,000 volumes in the library. G. Stanley Hall is the president.

CLARY (*Salvia sclarea*), a plant of the same genus with sage, a native of the south of Europe. Its flowers are used for making a fermented wine, esteemed for its flavor.

CLASSICS OR CLASSICAL LEARNING. The term *classici* was originally applied to those citizens of Rome that belonged to the first and most influential of the six classes into which Servius Tullius divided the population. As early as the second century after Christ it was applied figuratively to writers of the highest rank, and this mode of designation has since been generally adopted both in literature and art. As the great productions of writers and artists of antiquity have continued to be looked upon by moderns as models of perfection, the word *classics* has come to designate, in a narrower sense, the best writers of Greece and Rome. See ITALY, Vol. XIII, p. 506.

*CLASSIFICATION (of plants), usually styled *Taxonomy*. The current classifications of plants have been the natural development of all previous schemes of classification. The earliest observers were impressed with the necessity of reducing plants to some orderly arrangement, and this phase of botany became so impressed upon the science that until very recent times it was little more than a science of classification. In this form it appealed to the collector spirit, and hence became a very popular pursuit. The earliest classifications were necessarily based upon the most superficial observations, and numerous "artificial systems" became current, culminating in the famous one devised by Linnæus. These systems were "artificial," in that they selected some one character as a basis, which would usually result in bringing an aggregation of plants together that held no real relationship to each other, just as the words in a dictionary are arranged in alphabetical sequence, resulting in bringing into juxtaposition words of most diverse origin. The dogma of the permanency of species lent itself kindly to these artificial arrangements; and if the determination of the name of a plant were the end of classification, artificial schemes would never fall into disuse, as they are far easier of manipulation than any natural scheme. Many of the earlier botanists were fully conscious of the fact that a natural scheme must ultimately replace the artificial ones, but they were entirely cut off from any attempt at its construction by lack of knowledge. It was only after the idea of evolution had become a dominant one, and morphological investigation had yielded a large amount of data, that any attempt could be made to arrange plants according to their genetic relationships. Botanists had been writing of "families" of plants, but not at all implying "blood relationship" by the name. Natural systems of classification have been rapidly multiplying ever since the first attempt, and rightly so, for continuous morphological investigation is ever adding new facts, which demand a shifting of the old lines. Any scheme of classification is simply an expression of current knowledge concerning relationship, and as knowledge increases, classifications must change. It is reasonably safe to assume, however, that most of the large lines have been permanently drawn, and that subsequent shiftings will be concerned with details.

It would not be profitable to give a complete account of systems of classification, but a few prominent ones will serve to illustrate the subject. Probably the first system proposed that is worthy of scientific attention is that of John Ray, published in 1703. His grouping is as follows:

1. Herbs.
   a. Flowerless plants.
   b. Flowering plants.
      (1) Dicotyledons.
      (2) Monocotyledons.
2. Trees.
   a. Monocotyledons.
   b. Dicotyledons.

*Copyright, 1897, by The Werner Company.

In this scheme, the primary division into herbs and trees is a relic of the older classifications, and is essentially artificial. The grouping, also, of the "flowerless plants" under herbs was simply a shelving of that great assemblage of lower forms about which very little was known. The notable feature of the scheme, however, is its recognition for the first time of the fundamental distinction between Dicotyledons and Monocotyledons.

The system of Linnæus, dating from 1733, was even more confessedly artificial, but at once became so popular that it continued in use for more than a century. It was based upon the number, relative position and union of the stamens with regard to each other and to the pistil. The names of his 24 groups are self-explanatory to any one familiar with botanical terminology, and are as follows: (1) Monandria, (2) Diandria, (3) Triandria, (4) Tetrandria, (5) Pentandria, (6) Hexandria, (7) Heptandria, (8) Octandria, (9) Euneandria, (10) Decandria, (11) Dodecandria, (12) Icosandria, (13) Polyandria, (14) Didynamia, (15) Tetradynamia, (16) Monadelphia, (17) Diadelphia, (18) Polyadelphia, (19) Syngenesia, (20) Gynandria, (21) Monœcia, (22) Dicœcia, (23) Polygamia, (24) Cryptogamia.

Such a scheme enabled the student of botany to determine rapidly the name of a plant, but it taught him nothing of its relationships.

The classification proposed by Antoine de Jussieu, bearing the date 1789, is probably the first that deserves to rank as a natural scheme. It is as follows:

1. Acotyledons (Cryptogams in general).
2. Monocotyledons.
   a. Flowers hypogynous.
   b. Flowers perigynous.
   c. Flowers epigynous.
3. Dicotyledons.
   a. Apetalæ. { Flowers hypogynous. / Flowers perigynous. / Flowers epigynous.
   b. Monopetalæ. { Flowers hypogynous. / Flowers perigynous. / Flowers epigynous.
   c. Polypetalæ. { Flowers hypogynous. / Flowers perigynous. / Flowers epigynous.
   d. Diclines irregulares.

De Jussieu is certainly to be commended for his recognition of the fundamental character in any natural system of the hypogynous, perigynous, and epigynous conditions.

The classification proposed by De Candolle in 1819 is as follows:

1. Vascular plants.
   a. Exogens.
      (1) Diplochlamydeæ.
         (a) Thalamifloræ.
         (b) Calycifloræ.
         (c) Corollifloræ.
      (2) Monochlamydeæ.
   b. Endogens.
      (1) Phanerogams.
      (2) Cryptogams.
2. Cellular plants.

It will be noted that up to this time no attempt was made to characterize the Cryptogams. They were disposed of in a lump, with some negative statement.

Although presenting no scheme of classification, the name of Robert Brown cannot be omitted, as in 1827 he published his demonstration of the nature of Gymnosperms, and showed that they could not be longer associated with Dicotyledons, though with wonderful persistence this obsolete association continues in manuals still current.

Endlicher, in 1836–40, proposed the following scheme, which contains several new points:

1. Thallophytes.
   a. Protophytes (algæ and lichens).
   b. Hysterophytes (fungi).
2. Cormophytes.
   a. Acrobrya (mosses, ferns, etc.).
   b. Amphibrya (monocotyledons).
   c. Acramphibrya (gymnosperms and dicotyledons).

Although somewhat fantastic in his group distinctions of Cormophytes, the scheme is notable for its attempt to incorporate the Cryptogams.

It is in Brongniart's classification of 1843 that the familiar grouping into Cryptogams and Phanerogams appears, as follows:

1. Cryptogams.
   a. Amphigenæ (algæ and fungi).
   b. Acrogenæ (mosses and ferns).
2. Phanerogams.
   a. Monocotyledons.
   b. Dicotyledons.
      (1) Angiosperms.
      (2) Gymnosperms

This classification is probably more familiar to English-speaking botanists than any other, as it has ever since been current in their manuals. With the exception of the disposition of the Gymnosperms, it well indicates the larger groupings as accepted to-day.

Alexander Braun, in 1864, proposed the following arrangement, in which more of the terminology of to-day appears, and which properly places the Gymnosperms:

1. Bryophytes (algæ, fungi, mosses).
2. Cormophytes (ferns, equisetums, lycopods).
3. Anthophytes.
   a. Gymnosperms.
   b. Angiosperms.
      (1) Monocotyledons.
      (2) Dicotyledons.

It was due to the researches of W. Hofmeister (1849–51) that the real relation between "Cryptogams" and "Phanerogams" was established, and systems of classification began to be arranged upon a more scientific basis. Among these more modern systems but three need to be mentioned, the last of which represents the most recent complete statement.

The classification proposed by Sachs, and made familiar to American students by Bessey, is as follows:

1. Thallophytes.
   a. Protophytes.
   b. Zygophytes.
   c. Oöphytes.
   d. Carpophytes.
2. Bryophytes.
   a. Hepaticæ.
   b. Musci.
3. Pteridophytes.
   a. Equisetineæ.
   b. Filicineæ.
   c. Lycopodineæ.
4. Phanerogams.
   a. Gymnosperms.
   b. Angiosperms.
      (1) Monocotyledons.
      (2) Dicotyledons.

The special feature of the scheme is the primary grouping of Thallophytes, which is based upon reproductive characters, instead of the presence or absence of chlorophyll.

The Eichler system of 1883 follows the same general lines, except that the Thallcphytes are primarily divided into Algæ and Fungi.

The system of Engler, outlined in 1892, is just now appearing in detailed statement in the great work, *Die Natürlichen Pflanzenfamilien.* As in all of the more modern arrangements, its peculiar features are to be found in the grouping of the Thallophytes, concerning whose proper arrangement there is the greatest diversity of opinion. Even the primary divisions of plants are somewhat modified as follows:

1. Myxothallophyta (the slime-molds).
2. Euthallophyta (the real Thallophytes).
3. Embryophyta zoidiogama (including the Bryophytes and Pteridophytes, and named from their possession of spermatozoids. To the same group the name "Archegoniates" is often applied, referring to the characteristic female sex-organ, the archegonium).
4. Embryophyta siphonogama (referring to the development of a pollen-tube. The group otherwise known as Phanerogams, Anthophytes and Spermaphytes).

Engler's larger grouping of his Euthallophytes is as follows: (1) Schizophyta, (2) Dinoflagellata, (3) Bacillariales, (4) Gamophyceæ (including the green, brown and red algæ), (5) Fungi.

The changes soon to be made in grouping will doubtless concern the breaking up and establishing of primary divisions among what are now known collectively as Thallophytes, and the association of those forms developing an archegonium (Bryophytes, Pteridophytes, and possibly Gymnosperms) as a primary division bearing the name Archegoniates. The fact that Gymnosperms develop both an archegonium and a seed will continue to make them a troublesome factor in grouping.

In conclusion, the scheme of classification in largest use at present, and referable to no botanist in particular, is as follows:

1. *Thallophytes:* Vegetative organs (such as root, stem and leaf) and tissues mostly undifferentiated; alternation of generations wanting or but feebly developed; reproduction non-sexual or sexual, in the latter case showing no differentiation of sex, or a distinct differentiation into the sex-organs known as *antheridium* and *oögonium.*
   a. Algæ: Plants containing chlorophyll.
   b. Fungi: Plants without chlorophyll.
2. *Bryophytes:* Vegetative organs and tissues differentiated, but with no development of a vascular system; alternation of generations distinct, the gametophyte developing the vegetative organs; sexual reproduction by means of an antheridium (developing spermatozoids) and an archegonium.
   a. Hepaticæ (liver-worts): Plants more or less thalloid and usually dorsiventral in their symmetry.
   b. Musci (mosses): Plants with distinct axis, bearing leaves, and radial in their symmetry.
3. *Pteridophytes:* A vascular system developed; alternation of generations distinct, but the sporophyte bearing the vegetative organs; sexual reproduction as in Bryophytes.
   a. Filicineæ (ferns.)
   b. Equisetineæ (horse-tails).
   c. Lycopodineæ (club-mosses).
4. *Spermatophytes:* Alternation of generations indistinct through great reduction of the gametophyte and consequent development of the structure known as the "seed."
   a. Gymnosperms (cycads, conifers and gnetums).
   b. Angiosperms.
      (1) Monocotyledons.
      (2) Dicotyledons.
         (a) Archichlamydeæ.
         (b) Sympetalæ.

JOHN M. COULTER.

CLASSIS, a court in some of the reformed churches of Holland and America, composed of the ministers and ruling elders, and ranking between the consistory and the synod, and exercising functions analogous to those of presbyteries in the Presbyterian Church. Appeals are made from consistories to classis, and from the latter to synods. This court ordains, confirms and deposes ministers, and can dissolve ministerial connections; it sends two ministers and two delegates to the synod, and three ministers and three elders to the general synod.

CLASTIC ROCKS are those composed of fragmental materials. The term includes all rocks of a secondary or derivative origin, as conglomerate, sandstone, shale, etc., which have been formed out of the remains of previously existing rocks. Besides the large class of sand and gravel rocks, it also embraces many rocks of organic origin, such as certain limestones, composed of the *débris* of shells, corals, etc.; coals made up of the remains of plants; some ironstones, consisting in whole or in part of organic *débris.* Fragmental volcanic rocks, such as tuff and agglomerate, come also into the same division.

CLAUSEWITZ, KARL VON, Prussian general; born at Burg, June 1, 1780; died of cholera, at Breslau, Nov. 16, 1831. He served with distinction in several campaigns in the Prussian and in the Russian service; in 1815 became chief of the Prussian army corps, and was ultimately director of the army school and inspector of artillery. His writings prepared the way for a complete revolution in the theory of war. Of his works the best known is his great book on war, *Vom Krieg* (3 vols., 4th ed. 1880), and his *Life of Scharnhorst.*

CLAUSIUS, RUDOLF JULIUS EMANUEL, a German physicist; born at Köslin, Prussia, Jan. 2, 1822; was educated at the Berlin University; became professor at the Polytechnic Institution of Zurich in 1855, at the University of Würzburg in 1867, and at the University of Bonn in 1869. He developed a fundamental theorem in thermodynamics which made him noted. (See ATOM, Vol. III, pp. 38, 39.) This was done contemporaneously with and independently of Macquorn Rankine in Britain, both these investigators proceeding upon the same lines and with identical results, alike in the development of this theorem and in regard to the discovery of the partial condensation of steam at usual temperatures and pressure by thermodynamic action. His best-known books are *Die Mechanische Wärmetheorie* (1876–91) and *Die Potentialfunktion und das Potential.* He died at Bonn, Aug. 24, 1888.

CLAUSSON, PEDER, a Norwegian author; born April 1, 1545; died Oct. 15, 1614. See DENMARK, Vol. VII, p. 90; and NORWAY, Vol. XVII, p. 589.

CLAUSTHAL. See KLAUSTHAL, Vol. XIV, p. 108.

CLAVARIA, a genus of hymenomycetous fungi, of the family *Clavariaceæ*, in which the spore-bearing tissue is produced over all parts of the surface. The species are numerous, some of them simple and club-shaped, some branched, the branches usually being thick and round. *C. botrytis*, a species common in oak and beech woods, especially in Germany, is gathered when young and used as food. Other species, notably *C. flava*, *coralloides*, *aurea* and *formosa*, are used in the same way.

CLAVICLE, an important part of the pectoral girdle of vertebrates, perhaps most familiarly known in the collar-bone of man and in the "merry thought" of birds. It is well developed in those mammals in which the fore-leg or arm is used very strongly and freely, but is poorly developed or absent in many cases, as in carnivores and ungulates. In most flying-birds it is strong, and often fused to the breast-bone. It is a paired bone superadded from the skin as an auxiliary to scapula and coracoid. Its position is ventral and anterior to the coracoid, and it is often associated with an interclavicle. See ANATOMY, Vol. I, p. 826.

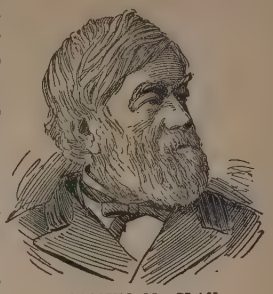
CLAVICORNES, a great family of coleopterous insects, of the section *Pentamera*. Most of the beetles of this family feed on animal substance, and many of them find their appropriate food in substances undergoing decay. See COLEOPTERA, Vol. VI, p. 131.

CLAVIJERO, FRANCISCO XAVIER, a Mexican historian; born at Vera Cruz in 1731; entered the order of the Jesuits in 1748; became a teacher of rhetoric and philosophy and studied Aztec history and language. On the suppression of the Jesuits in Spanish America in 1767, Clavijero retired to Italy, where he died at Bologna in 1787. He wrote in Italian a *History of Mexico*, an impartial and valuable work, of which an English translation, by C. Cullen, was published in 1788. His *Storia della California* was published posthumously.

CLAXTON, KATE. See STEVENSON, MRS. CHARLES A., in the Supplements.

CLAY, a term applied to those kinds of earth or soil which, when moist, have a notable degree of tenacity and plasticity. The clays appear to owe their origin to the decomposition of various rocks, and to consist chiefly of aluminic silicate along with other ingredients, which vary in character with the nature of the parent-rock from the degradation of which they are derived. Thus common clay is a mixture of kaolin or China clay (which is a hydrated clay) and the fine powder of some felspathic mineral which is anhydrous and not decomposed. See MINERALOGY, Vol. XVI, p. 424.

CLAY, CASSIUS MARCELLUS, politician, born in Madison County, Kentucky, Oct. 19, 1810. While studying in Yale College, from which he graduated in 1832, he heard William Lloyd Garrison speak, and this influenced him to become an abolitionist and to free his own slaves. Entering the legal profession on his return to Kentucky, he attained prominence, and was elected, in 1835, to the legislature; re-elected in 1837 and again in 1840. The improvements in the common schools and in the jury system of Kentucky are due to Mr. Clay's efforts. Mr. Clay was the supporter of Henry Clay for the Presidency, the opposer of the annexation of Texas, and in 1845 the editor of an antislavery paper, *The True American*, issued at Lexington, whence he had removed; but his presses were seized, and he was threatened with assassination. He fortified and armed his premises and continued his publication, having it printed in Cincinnati, but issued from Lexington. He served and was taken prisoner in the Mexican War, and aided in the election of President Taylor. He labored for the election of Frémont in 1856 and Lincoln in 1860. The following year he was sent as minister to Russia, but returned to America in 1862, being made major-general of volunteers. Refusing to serve as long as slavery was recognized, Mr. Clay left the Union army and went again to Russia, remaining as minister from 1863 to 1869.



CASSIUS M. CLAY.

After the war he supported the revolutionary movement in Cuba in 1870; he gave political support to Horace Greeley in 1872, to Samuel J. Tilden in 1876, and although a Democrat, advocated the election of Mr. Blaine in 1884. For killing a negro, Perry White, in 1877, Mr. Clay was tried, but acquitted, the jury bringing in a verdict of "justifiable homicide," as the man, a discharged servant, had threatened his life. In 1894, at the age of 84, he married a 17-year-old ward, of poor family, against the opposition of his sons, and on their attempted abduction of the girl, armed his servants, put his house in a state of siege, and threatened death to any one who should interfere.

CLAY, CLEMENT CLAIBORNE, an American politician; born at Huntsville, Alabama; son of United States Senator Clement Comer Clay. The son studied law, being called to the bar in 1840; became a judge in 1844, and United States Senator from 1854 to 1861. In the Senate he was an extreme advocate of states' rights principles In 1861 he entered the Confederate senate and was a Confederate secret agent in Canada in 1864. He was alleged to have been implicated in the assassination of President Lincoln, but was exonerated on trial; returned to the practice of his profession, and died near Huntsville, Jan. 3, 1882.

CLAY, HENRY, JR., an American soldier, and son of the statesman of the same name; born at Ashland, Kentucky, April 10, 1811, was gradu-

ated at West Point in 1831. He subsequently studied law, and became a member of the Kentucky house of representatives from 1835 to 1837. He took part in the war with Mexico, being lieutenant-colonel of the Second Kentucky Volunteers. He was mortally wounded at Buena Vista, dying Feb. 23, 1847.

CLAY, James Brown, an American statesman, and a son of Henry Clay; born at Washington, District of Columbia, Nov. 9, 1817; educated at Transylvania University, and after a residence in Missouri, studied law, and practiced with his father until 1849, when he was appointed *chargé d'affaires* at Lisbon. He became proprietor of Ashland upon the death of his father, and was elected to represent his native district in Congress in 1857. He supported the Confederate cause, and died in Montreal, Jan. 26, 1864.

CLAY CENTER, a town and the capital of Clay County, northeastern Kansas, situated on the Republican River, about 125 miles W. of Leavenworth, also on the Chicago, Rock Island and Pacific and the Union Pacific railroads. It contains a variety of manufactories, and is an important center of trade. Population 1895, 2,723.

CLAY CROSS, a town in Derbyshire, northern central England, 4½ miles S. of Chesterfield, on the Midland railroad, the center of a coal and iron district. Population, 6,879.

CLAYDEN, Arthur William, an English scientist; born at Boston, Lincolnshire, Dec. 12, 1855; educated at Christ's College, Cambridge, obtaining a foundation scholarship in 1875, and graduating with distinction in natural sciences in 1876. In 1887 he became lecturer in London on the University Extension Schemes of Cambridge and London. He is a fellow of most of the scientific societies, and has contributed important papers to the society journals, including *On the Thickness of Shower Clouds* (1886); *On a Working Model of the Gulf Stream*, in which is described an invention demonstrating the wind theory of ocean currents (1889); *Note on Some Photographs of Lightning and of "Black" Electric Sparks* (1889); *On "Dark" Flashes of Lightning* (1889). The two latter papers showed that a phenomenon that had long been a scientific puzzle was nothing more than a form of photographic reversal.

CLAY-EATERS. See America, Vol. I, p. 703; and Geophagism, in these Supplements.

CLAYMORE. See Sword, Vol. XXII, p. 801.

CLAYS, Paul Jean, a Belgian painter; born at Bruges in 1819; studied in Paris under Gudin, and developed a preference for marine subjects. He settled in Brussels, and there received a gold medal in 1851. He has exhibited at the Salon *The Zuyder Zee, near Texel* (1877); *The North Sea* (1876); *The Thames, near London* (1875); *Entrance to Southampton Water* (1868); etc. At the Johnston sale in New York City, 1876, *A Marine, Dutch Shipping*, sold for $3,550. He received second-class medals at the Paris expositions of 1867 and 1878, was appointed an officer of the Legion of Honor and decorated with the Order of Leopold.

CLAYTON, a village and the capital of Barbour County, southeastern Alabama, on the Central Railroad of Georgia, 75 miles S.E. of Montgomery. The neighborhood is a fruit and grain growing district. Population 1890, 997.

CLAYTON, a village of Jefferson County, northwestern New York, on the Rome, Watertown and Ogdensburg railroad, 19 miles N.N.W. of Watertown, and on the St. Lawrence River, at the western end of the region of the Thousand Islands. It is a summer resort, and a place where some boat-building is carried on. Population 1890, 1,748.

CLAYTON, John, an American botanist; born at Fulham, Middlesex, England; emigrated to the United States in 1705, settling in Virginia, where he was clerk for Gloucester County for fifty years, and made a study of the natural history of the colony and a collection of its botany. His articles on the former were published by the Royal Society of London. Linnæus and Gronovius published a *Flora of Virginia Exhibiting the Plants which J. Clayton has Collected* (1739). Gronovius named a genus of herbaceous plants *Claytonia* in his honor. He died Dec. 15, 1773.

CLAYTON, John Middleton, an American jurist; born in Dagsboro, Sussex County, Delaware, July 24, 1796; died in Dover, Delaware, Nov. 9, 1856. He graduated at Yale in 1815; became a lawyer; was elected to the legislature in 1824; elected to the United States Senate in 1829 and 1835; was Secretary of State under President Taylor, and served in the United States Senate from 1845 to 1849, and from 1851 to 1856. He acquired a reputation for oratory while in the Senate, his best efforts being the speeches on the Foote resolution, in which he discussed nullification, the argument favoring the paying of French spoliation claims, and his defense of the Clayton-Bulwer treaty (q.v., in these Supplements), and of President Taylor's administration.

CLAYTON, Powell, an American statesman; born at Bethel, Pennsylvania, Aug. 4, 1833; studied civil-engineering, and was chosen engineer and surveyor of Leavenworth, Kansas, in 1859. He entered the Civil War as lieutenant-colonel of the Fifth Kansas Cavalry, and was honorably mustered out in 1865 as a brigadier-general. After the war he settled in Arkansas and was elected governor in 1866. He was elected to the United States Senate in 1871, and appointed minister to Mexico in 1897.

CLAYTON-BULWER TREATY, the name of a treaty entered into between the United States and Great Britain, relating to the establishment of communication by means of a ship-canal between the Atlantic and Pacific oceans. It received its name from the contracting parties, Sir Henry Bulwer Lytton (afterward Lord Dalling), on the part of Great Britain, and John Middleton Clayton (Secretary of State under Taylor), on behalf of the United States. It was signed at Washington on April 19th, and ratifications exchanged there, July 4, 1860. By it the contracting parties agreed not to erect fortifications on the banks or in the vicinity of the proposed canal, and that they

would not assume dominion over Nicaragua, Costa Rica, the Mosquito Coast, or any part of Central America. (See DALLING, Vol. VI, p. 782.) Opposite and contrary constructions having been put upon this treaty by the contracting parties, another treaty, known as the Clarendon-Dallas treaty, was agreed to and signed at London, Oct. 17, 1856. But this also was open to objections, and it was ultimately rejected, and in President Buchanan's message of 1859 he recommended the abrogation of the Bulwer-Clayton treaty as the best means of solving the difficulty. The commencement of the new canals, the Panama canal and the Nicaragua ship-canal, again brought the Bulwer-Clayton treaty up for discussion.

CLAYTONIA, an American and Siberian genus of low herbs, belonging to the family *Portulacaceæ*. In the eastern United States *C. Virginica* is the common species of early spring, with a pair of opposite leaves and a raceme of delicate white to rose-colored flowers. The species are commonly known as "spring beauties."

CLEARANCE is a certificate given by the collector of a port showing that the commander or master of a vessel has entered and cleared his vessel according to law. It is a permission to sail, and contains the name of the commander, the name or description of the vessel, the name of the port for which the vessel sails, and, if required, a description of the goods on board. The laws of the United States require the collector to annex to the clearance of any duly registered vessel, bound on a foreign voyage, a schedule of the rates to be allowed according to law. The master of a vessel bound for a foreign port must furnish to the collector a sworn manifest of all the cargo on board, and the value thereof, whereupon he shall be entitled to a clearance for his vessel. If he shall depart on such voyage without a clearance, the master shall forfeit five hundred dollars for each offense. It is also very necessary for the safety of a vessel that a clearance be obtained, for if found at sea without a clearance, the vessel may be legally taken and carried to some court on a charge of piracy.

CLEAR, CAPE, a headland of Clear Island, the most southerly point of Ireland, with a light-house on a cliff 455 feet in height, and a telegraph station for reporting vessels.

CLEARFIELD, a borough and the capital of Clearfield County, western central Pennsylvania, on the Pennsylvania, the Beach Creek and the Buffalo, Rochester and Pittsburg railroads, and on the west branch of the Susquehanna. It has lumber manufactories, a foundry, machine-shops, a public park and an academy. Population 1890, 2,248.

CLEARING-HOUSE. The first clearing-house in New York City was organized Oct. 11, 1853, 38 bankers forming an association for that purpose. Since that time until November, 1895, the amount of clearances have been over $850,000,000,000. The figures, in millions, were: For the year 1892, $36,662; for 1893, $29,045; for 1894, $22,051; for 1895, $26,931. The bank clearing-house is situated at No. 77 Cedar Street. Sixty-six banks are associated for the purpose of exchanging the checks and bills they hold against each other. Other banks, not members of the association, clear through members. The representatives of the members appear at their desks in the clearing-room at ten a.m. every business day, with the checks and bills to be exchanged. Each bank is represented by two clerks, a settling and a delivery clerk. The settling-clerk furnishes the manager of the clearing-house with a credit ticket which shows the amount of exchange which his bank has brought, which exchanges are noted down by the proof-clerk of the clearing-house. The settling-clerk takes his seat at his desk, and has before him a settling-sheet, upon which is entered against the name of each bank the amount brought in exchanges against it. The delivery clerk has a similar list, and takes his place beside his bank's desk, and has the exchanges themselves in a receptacle, arranged in order, so that at the sound of the gong he advances to the desk ahead of him, delivering the exchanges which should be there delivered, obtaining upon his list a receipt from the settling-clerk seated there. Every desk is thus visited. While the delivery clerk of one bank has been making his rounds, the settling-clerk of his own bank has been similarly visited by the delivery clerks of the other banks, giving each settling-receipts. About ten minutes is sufficient to complete this part of the business. Each delivery clerk has receipts for all the exchanges that he has brought, and each settling-clerk has a record of the amount brought for, and the amount received from, each bank. The delivery clerk takes the latter amount to his bank's desk, where the settling-clerk adds up the total amount and gives the proof-clerk of the clearing-house a debit-slip stating the amount, as well as the amounts brought, and the resulting balance due to the bank from the clearing-house or to the latter from the bank, according to the results of the transactions of the previous day at the bank itself. About half an hour is generally required to accomplish this. Each bank owing a balance to the clearing-house has settled with the latter before 1:30 p.m. The credit banks receive immediately thereupon the balance due from the clearing-house. Provision is made for the detection and prevention, as far as possible, of errors in calculations. The amount of clearances done in New York does not strictly represent the amount of local business, for that clearing-house acts in a great measure for the banks of a considerable portion of the whole country. All the other important cities have clearing-houses conducted similarly to the one in New York. The grand total of clearances for the United States, so far as could be accurately ascertained, in millions of dollars, were, for 1893, 49,791; for 1894, 40,912; for 1895, 47,808; and for Canada, for the same respective years, 897; 837; 893.

A STOCK EXCHANGE CLEARING-HOUSE was established in New York City, May, 1892, by means

of which stock exchange business is settled by a combination of stock and cash balances; both remarkably small in proportion to the enormous aggregate of business transacted. See BANKING, Vol. III, pp. 328, 329.

CLEARING-HOUSE CERTIFICATES, certain evidences of value, or of credit, taking the place of money for the time being, and especially used by the Clearing-House Association of Banks. It is one of the developments in banking procedure, whereby the clearing-house combination, or association of banks constituting the clearing-house, is pledged to maintain the credit of every member of the association. Its beneficial effects will be readily comprehended by stating that if a bank is threatened with a run on its funds, and cannot convert its securities into ready cash to meet the contingency without heavy loss, owing either to the temporary or other depreciation in the value of the securities, or the inability at the moment to convert them into cash because of a possible stringency of the money market, the other banks in or of the association come to the rescue, by the issuance of certificates from the clearing-house, which certificates are good at any bank in the association for their face value, and have the immediate effect of restoring confidence in the minds of depositors. For example, suppose, in the event of a "run" on a given bank, the demand for a million and a half of dollars is made; it would require three tons of gold coin to meet it, involving an immense expense as well as risk; whereas under the system of clearing-house certificates there is a guaranty given that a sum sufficient to satisfy all demands has been deposited, subject to the return on demand, and the entire body composing the Clearing-House Association is pledged to maintain the integrity of the certificate.

The totals of the general proof being daily transferred to the ledger, reference to this is alone necessary to ascertain the dealings of each individual bank, day by day, month by month, and year by year, since it became a member of the association. There is a constant check upon irregularities, as all the banks are under the scrutinizing eye of the clearing-house. Each one of the body fully realizes how greatly expulsion would jeopardize its credit. This latter feature has done much to prevent the undue extension of loans which would inevitably produce weakness and possible disaster. The system originated with F. W. Edmonds, formerly cashier of the Mechanics' Bank, New York City. He planned the issue of clearing-house certificates in 1852, and paved the way for the smooth and successful business management subsequently developed in the banking world.

CLEARING-NUT (*Strychnos potatorum*), a small tree, a native of India, whose seeds are much used for clearing water. A seed rubbed around the inside of a vessel of muddy water causes the impurities to settle rapidly.

CLEAR LAKE, a sheet of water in Lake County, northern California. It is 24 miles long and from 2 to 6 miles broad, and is much frequented by hunters and tourists on account of the various kinds of game which frequent its shores and the fish in its waters. Deer, bears, panthers, and foxes abound. Another lake of the same name is found in Modoc County, in the northeastern part of the same state. It is small and saline, and has no outlet.

CLEAVAGE. See CRYSTALLOGRAPHY, Vol. VI, p. 672.

CLEAVELAND, MOSES, an American general and pioneer; born at Canterbury, Connecticut, Jan. 26, 1754; was graduated at Yale in 1777; practiced law, and was commissioned captain of a company of sappers and miners serving during the close of the Revolutionary War. He was several times elected to the legislature and was commissioned briadier-general of militia in 1796. He was a shareholder in the Connecticut land company which had purchased from the state, for $1,200,000, the land north of the Ohio, reserved to the state by Congress, and afterward known as the Western Reserve. Cleaveland was appointed to survey the land, and selected the site of what became the city of Cleveland; the present spelling of the city named in his honor arising from the fact that in 1830, when the first newspaper was being issued at the place it was discovered that the title chosen, "Cleaveland Advertiser," was too long for the form, to overcome which the editor shortened the first word by one letter, which spelling was adopted by the citizens. Cleaveland died in his native town, Nov. 16, 1806.

CLEAVELAND, PARKER, an American mineralogist; born at Rowley, Massachusetts, Jan. 15, 1780; was graduated at Harvard in 1799, and was appointed, in 1805, professor of mineralogy, chemistry, etc., in Bowdoin College, Maine, which position he held until his death. He was the author of a work, *Mineralogy and Geology* (1816), which brought him into prominent notice in Europe. He died in Brunswick, Maine, Oct. 15, 1858.

CLEBURNE, a town of Johnson County, northeastern Texas, on the Gulf, Colorado and Santa Fé railroad; about 50 miles S.W. of Dallas and 155 miles N. of Austin. The town has a college for young women, handsome public buildings, an ice factory and mills. It had a population of 1,855 in 1880 and of 3,278 in 1890. The growth is due chiefly to agricultural activity.

CLEBURNE, PATRICK RONAYNE, an American soldier; born in Cork County, Ireland, March 17, 1828; killed in the battle of Franklin, Tennessee, Nov. 30, 1864. He early showed a predilection for the army, and enlisted in the Forty-first Regiment of infantry in the English service. After several years in the military service, he came to the United States and located at Helena, Arkansas, where he adopted the profession of law, in which he was succeeding at the commencement of the Civil War in 1861. He enlisted in the Confederate army as a private; contrived the capture of the United States arsenal in Arkansas in March, 1861; was soon afterward promoted from the rank of captain to that of colonel;

and was promoted to the grade of brigadier-general in March, 1862. At the battle of Shiloh he commanded a brigade in the Third Army Corps, and signalized himself by courage and sagacity. He was made major-general in December, 1862, and commanded a division of the right wing of the Confederate army at the battles of Stone River and Chickamauga. He distinguished himself in covering the retreat of General Bragg's army after the battle of Mission Ridge in November, 1863, and was commended by the Conerate congress for his heroic and successful defense of Ringgold Gap. He was a division commander under General Joseph E. Johnston during his famous campaign in north Georgia, and distinguished himself in a number of its various battles. He commanded a corps at the battle of Jonesboro, Georgia, also at Franklin, Tennessee, where he was killed in storming the second line of the Federal works.

CLEEF, Johann van, a Flemish painter; born at Venloo in 1646, and studied under Gaspar de Crayer. He excelled in the treatment of draperies and figures, and finished the cartoons for the tapestries of Louis XIV after the death of his master. His works adorn the churches in Ghent and Antwerp, among his most famous being *The Redemption of the Captives*. He died in Ghent in 1716.

CLEG, a name given to some insects of the dipterous family *Tabanidæ*. The females are extremely troublesome to horses and cattle.

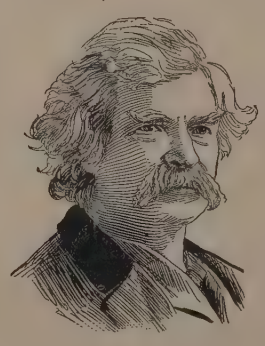
CLEISTOGAMY, a name applied to the habit of certain plants in producing flowers differing from the normal showy ones, in being inconspicuous, seldom opening, and capable of self-pollination. These cleistogamous flowers seem to be a device to insure the production of seed in case the more showy flowers fail of cross-pollination. Notable examples are the species of violet, although the list of known cleistogamous plants is becoming quite a long one.

CLEMATIS, a genus of plants of the family *Ranunculaceæ*, mostly herbaceous climbers. There are many species, natives of the temperate climates. *C. viorna*, *cylindrica* and *virginiana* are the best-known species in the United States. There are many forms in cultivation, with large flowers of various colors, mostly varieties or hybrids that have been obtained from *C. viticella* of Europe, *C. lanuginosa* of China, and the Japanese species, *C. azurea* and *C. florida*.

CLÉMENCEAU, Eugène, a French statesman, born at Mouilleron-en-Pared, in Vendée, France, Sept. 28, 1841; studied medicine at Nantes and Paris, and practiced as a physician in Montmartre, the workingman's quarter of Paris. He was appointed mayor of the eighteenth arrondissement of Paris, and a member of the commission of communal education after the revolution of Sept. 4, 1870. In February, 1871, he was elected representative in the Assembly for the department of the Seine, and took his seat with the members of the Extreme Left, or Radicals. He was shut up in Paris during both sieges, and came near falling a victim to the suspicions of the Communist Central Committee. He tried to save the lives of Generals Lecomte and Clement Thomas, who were murdered by the Communists, and being charged later with lukewarmness in this matter, challenged and wounded his slanderer. In 1871 he became a member, and in November, 1875, president, of the municipal council of Paris, and in 1876 again became a deputy. He showed himself an aggressive Radical, bitterly opposed the Duc De Broglie and MacMahon, and energetically supported Gambetta, who was his cousin. When, in 1879, Grévy became President and Gambetta speaker of the Assembly, M. Clémenceau became leader of the Extreme Left, and remained a Radical when Gambetta became an Opportunist. He helped to exclude the clergy from educational affairs and to expel the Jesuits, and obtained an amnesty for banished Communists. His newspaper, *La Justice*, was a political power. During the Panama scandal he was charged with selling his country, but the charges were shown to be based on forgeries, and he was vindicated, but defeated for re-election in September, 1894. He lived in Connecticut from 1865 to 1870, and married an American woman, Mary G. Plummer.

CLEMENS, Jeremiah, an American statesman; born in Huntsville, Alabama, Dec. 28, 1814; died there, May 21, 1865. After graduating at the State University in 1833, he became a lawyer; was appointed United States marshal for northern Alabama in 1838, and elected to the legislature in 1839, 1840, 1841 and 1843. He was connected with the army in 1842, when he went to Texas as lieutenant-colonel of volunteers, and in 1847–48 was an officer in the infantry. From 1849 to 1853 he was in the United States Senate, and in 1859 became editor, at Memphis, of the *Eagle and Enquirer*. Popular feeling influencing him, he became a secessionist, but in 1864 he declared for the Union cause. He was the author of several novels, some of which dealt with American history, among them being *Bernard Lyle* (1853); *Mustang Gray* (1857), *The Rivals* (1859); and *Tobias Wilson* (1865). Just previous to his death he was at work on a history of the war.

CLEMENS, Samuel Langhorne, an American humorist; born at Florida, Missouri, Nov. 30, 1835. He is best known by his pseudonym of "Mark Twain," which had been the pen-name of Captain Isaiah Sellers, who, previous to 1863, furnished river news to the New Orleans *Picayune*, and which was derived from the call of the leadsman on the Mississippi River boat when he sounds two fathoms. He was educated in the village school in Hannibal, Missouri, and was apprenticed to a printer. After learning his trade, he journeyed from town to



SAMUEL L. CLEMENS.

town until he reached New York. Afterward he went to New Orleans and became a pilot on the Mississippi River steamboats. In 1861 he went to Nevada as private secretary to his brother, who had been made secretary of the territory. He engaged in mining in Nevada, and in 1862 became city editor of the Virginia City *Enterprise*. In 1865 he went to San Francisco, where he was engaged as a reporter on the *Morning Call*. After experimenting in gold-mining, he resumed his work for the California press, and visited the Hawaiian Islands as newspaper correspondent in 1866. After his return he delivered humorous lectures in California and Nevada, and went to the East, where he published the *Jumping Frog, and Other Sketches* (New York, 1867). In 1867 he went with a party of tourists to the Mediterranean, Egypt and Palestine, publishing on his return *The Innocents Abroad* (Hartford, 1869), of which 125,000 copies were sold in three years. For a time he edited the Buffalo (New York) *Express*, and after his marriage settled in Hartford, Connecticut, in 1870.

In 1872 he lectured in England, and a London publisher issued an unauthorized collection of his writings, in which were published sketches which he did not write. Among his writings are *Roughing It* (1873); *Sketches Old and New* (1873); *Adventures of Tom Sawyer*, a story of boy-life in Missouri (1876); *Punch, Brothers, Punch* (1878); *A Tramp Abroad* (1880); *The Stolen White Elephant* (1882); *The Prince and the Pauper* (1882); *Life on the Mississippi* (1883); *Huckleberry Finn*, a sequel to *Tom Sawyer* (1885); *A Yankee at King Arthur's Court* (1889); *Pudd'nhead Wilson* (1895); and *Following the Equator* (1897). He also wrote, with Charles Dudley Warner, *The Gilded Age*, dramatized in 1879. In 1884 he founded the publishing house of Charles L. Webster and Co., which firm brought out General Grant's *Memoirs*. The firm failed in 1894, and to retrieve his fortunes Mr. Clemens started out on a lecturing tour around the world, and in 1895 achieved the novel distinction of being challenged to a duel by Max O'Rell, the French humorist. He turned to the serious side of literature, and achieved as great a success as with his inimitable humor. In a series of articles in the *North American Review* he critically and trenchantly dissected the laurels of James Fenimore Cooper, showing his novels to be riddled with author's errors and abounding in improbabilities. Next he turned his batteries on Shelley's domestic affairs, and mercilessly exposed the poet's mawkish sentiments and peculiar ideas on morality. His *Joan of Arc*, which saw the light in the *Century Magazine* (1896), anonymously, was, in the opinion of many critics, the most appreciative treatment ever accorded to the noble historic figure of the Maid of Orleans.

Few humorists in the range of literature have drawn more closely to the popular heart, or played more subtly and powerfully upon the sense of the ludicrous inherent in human nature. Yet the finer emotions of pathos and sympathy are no less awakened by the magic influence at Mr. Clemens's command. There is, inwrought in his most convulsing extravaganzas, always a touch of intensely human experience, to which the most indifferent sensibilities are compelled to respond, and, while scorning to point a moral in the conventional manner, Mark Twain unconsciously reaches the depths of life and character in his philosophy of laughter and the evident feeling he betrays.

CLEMENS ROMANUS. See APOSTOLIC FATHERS, Vol. II, p. 195.

CLEMENTINES. See APOSTOLIC FATHERS, Vol. II, p. 196.

CLEMMER, MARY, the maiden name of MRS. MARY HUDSON; q.v., in these Supplements.

CLEOMBROTUS, a Spartan general, son of Anaxandrides, king of Sparta, by his first wife; and, some said, the twin brother of Leonidas. After the battle of Thermopylæ, 480 B.C., he was appointed regent for Plistarchus, the infant son of Leonidas. He died the same year, and was succeeded in the regency by his son, Pausanias, who defeated the Persians near Platæa, in Bœotia, 479, B.C.

CLEOMBROTUS I, king of Sparta, son of Pausanias, and grandson of the former; reigned from 380 to 371 B.C. He commanded the Spartan troops against the Thebans, but was defeated at the battle of Leuctra, where he was killed, after a heroic resistance.

CLEOMEDES, a Greek writer on astronomy. Nothing is known regarding his life or the period when he flourished. His treatise is entitled *The Circular Theory of the Heavenly Bodies*, and is remarkable as affirming several truths of modern science, such as the spherical shape of the earth, the moon's orbit, etc. Cleomedes's treatise was first printed in Latin in 1498, and the last edition in German in 1832. See LIGHT, Vol. XIV, p. 577

CLEOPATRA'S NEEDLES. See ALEXANDRIA, Vol. I, p. 495; ARCHITECTURE, Vol. II, p. 390; OBELISK, Vol. XVII, p. 703.

CLERC, LAURENT, a French educator; born in La Balme, near Lyons, France, Dec. 26, 1785; died in Hartford, Connecticut, July 18, 1869. When only a year old he fell into the fire, and was so injured that he lost the sense of smell and hearing. Several years later Abbé Sicard took the lad and gave him so good an education that he became a teacher. Rev. Dr. Gallaudet persuaded him to come to America and found an institution for the instruction of the deaf and dumb. This he did, and in 1817 such a school was opened at Hartford, and M. Clerc devoted the rest of his life to this work.

CLERK, JOHN, a Scottish naval tactician and writer on naval tactics; sixth son of Sir John Clerk of Penicuick; born at Eldin in 1728; died May 10, 1812. He prospered as an Edinburgh merchant, and by 1773 purchased the small estate of Eldin at Lasswade, where he devoted himself to etching, to geology, and to the study of the theory and practice of naval tactics. On April 12, 1782, the manœuver, claimed by him as of his invention, for breaking the enemy's line was tried by Lord Rodney upon the French com-

manded by Admiral de Grasse, and a decisive victory was gained. (See RODNEY, Vol. XX, p. 618.)—His son, JOHN CLERK (1757–1832) was raised to the Scottish bench in 1823, when he assumed the judicial title of Lord Eldin.

CLERMONT–DE–LODÈVE, a town in the department of Hérault, central southern France, 23 miles N.W. of Montpellier. It has extensive manufactories of woolen cloth. Population, 5,685.

CLETHRA, a genus of shrubs or trees of the family *Ericaceæ*. *C. alnifolia*, the common species of the eastern United States, known as "white alder," has alternate sharply serrate leaves, and upright dense panicles of fragrant white flowers.

CLEVELAND, a wild mountainous district, with some picturesque fertile valleys, forming the east part of the North Riding of Yorkshire, England. In the south the hills rise 1,300 to 1,850 feet. An extraordinary change has been wrought in the aspect of the country by a rich discovery of ironstone in the Cleveland hills; since 1851 lonely hamlets have become populous towns. See YORK, Vol. XXIV, pp. 747, 748.

CLEVELAND, a city of Ohio. (See Vol. V, p. 828.) The population of the city has increased from 160,146 in 1880 to 261,546 in 1890, and to 345,000 in 1896 (estimated). The city covers an area of 31¾ square miles. Jan. 1, 1890, the assessed valuation of property in the city was $95,000,000; in 1896 (estimated), $135,700,000. The debt of the city was, in 1890, $8,156,200; in 1896, $5,950,000. The rate of taxation in 1890 was 2.83 per cent, and in 1896, 2.87 per cent. There were, in 1890, 2,300 manufacturing establishments, with a direct investment of $69,732,000, employing 50,674 persons, whose annual wages amounted to $28,355,505, and with an annual production of $113,249,115. The city contains eight shipyards, two of them of immense proportions, for building iron and steel vessels. Its ship-building industry is the largest of any place along the lakes. The city is the center of the iron-ore industry, its docks being the largest and most capacious of any on the lakes. The Standard Oil Company has here its headquarters, and the city leads in the petroleum business. The proportions of the leading manufactures, according to the census of 1890, will be seen from the following figures, representing the amount of the direct investment: Iron and steel, $9,344,000; iron and steel bolts, nuts, washers and rivets, $1,068,000; iron and steel forgings, $1,099,000; ironwork, architectural and ornamental, $94,647; foundries and machine-shops, $6,832,000; petroleum, $10,426,000; ship-building, $2,562,000; liquors (malt), $3,580,000; chemicals, lumber, paints and printing, including publishing, over $1,000,000 each. A harbor of refuge was constructed by the United States government and cost nearly $2,000,000; and the great viaduct, extending from the lake on the east side to the top of the hill on the west side, was completed at a cost of $2,225,000. The chief educational institutions include Adelbert College, which was established in 1826, at Hudson, as the Western Reserve College, and removed to Cleveland in 1882; the Cleveland Medical College, founded in 1834, and possessing a fine museum; the Case School of Applied Science, an important technological institution liberally endowed. These are considered parts of the Western Reserve University. The medical department of Wooster University is also located in the city. A feature worthy of mention in this connection is the "Educational Bureau," organized by prominent citizens, and designed to provide instruction and recreation for working men and women by means of lectures, concerts, and the free distribution of digested material on special subjects. The public libraries contain a total of over 127,000 volumes.

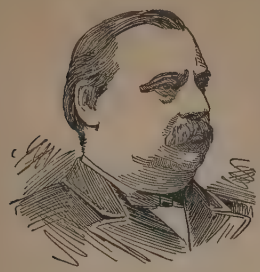
The city is perhaps best known abroad in connection with Euclid Avenue, which is regarded by many as the finest avenue in the United States. It is lined with beautiful private residences, with handsome grounds most tastefully laid out. About four miles out from the public square called Monumental Park, where a monument to Moses Cleaveland (q.v., in these Supplements) is erected, is Wade Park, on the north side of Euclid Avenue, consisting of 73 acres. It occupies a deep ravine and uplands. It has been skillfully treated, and is a favorite resort. Up to 1882 it was the private park of Jeptha H. Wade, a prominent citizen, who presented it to the city. Lake View Park, on the lake-front in the city portion, is much frequented. Lake View Cemetery contains the remains of President Garfield, to whom a fine monument has been there erected. Outside the city limits, to the northeast, lies the suburb of Glenville, where the famous trotting-track of that name is located, and where many fast records have been made. Cleveland celebrated its centenary July 22, 1896, on which occasion John D. Rockefeller presented the city with $600,000, about one half in cash, the balance in land, to be used for park purposes.

CLEVELAND, a railroad junction and the capital of Bradley County, southeastern Tennessee, on the Southern railroad, 29 miles E.N.E. of Chattanooga. It is an educational town and contains an academy, an institute for women, and the largest Southern college for women. Population 1890, 2,863.

CLEVELAND, CHARLES DEXTER, an American educator; born in Salem, Massachusetts, Dec. 3, 1802; died in Philadelphia, Pennsylvania, Aug. 18, 1869. Graduating at Dartmouth in 1827, he became a teacher of Latin and Greek in Dickinson College, and afterward in the New York University, and in a young ladies' school in Philadelphia. He was appointed consul to Cardiff, Wales (1861–1867). Professor Cleveland was the author of several works on English, American and classical literature, textbooks and songbooks for schools, and prepared a concordance to Milton's poems.

CLEVELAND, GROVER, President of the United States; born in Caldwell, Essex County, New Jersey, March 18, 1837. His ancestor, Moses Cleveland, emigrated from Ipswich, England, to Woburn, Massachusetts, in 1635, and his father, Richard F., was a Presbyterian clergyman who

named his son after the Rev. Stephen Grover, his predecessor in the Presbyterian Church in Caldwell. After the death of his father, Grover became a clerk and assistant teacher in the New York Institution for the Blind, and in 1855 he went to the West in search of employment. While passing through Buffalo he was persuaded to remain with his uncle, Lewis F. Allen, whom he assisted in preparing the *American Shorthorn Herd Book.* Afterward he became a clerk in the law firm of Rogers, Bowen and Rogers, studied law and was admitted to the bar in 1859. From 1863 to 1866 he was district attorney of Erie County. He became the law partner of Isaac V. Vanderpool, and in 1869 a member of the firm of Lanning, Cleveland and Folsom, practicing until 1870, when he was made sheriff of Erie County. In 1873 he became a member of the firm of Bass, Cleveland and Bissell, and he was noted for the logic and mastery with which he conducted his cases. In 1881 he was elected mayor of Buffalo, and soon became known as the "veto mayor," checking unwise, illegal and extravagant expenditure of public money and saving the city one million dollars in the first six months of his service. In 1882 he was elected governor of New York by a plurality of 192,854 over the Republican nominee, Charles J. Folger. Among the chief acts of his administration were his approval of a bill to submit to the people a proposition to abolish contract labor in the prisons; the veto of a bill which permitted wide latitude in which the directors of savings banks might risk deposits; the veto of a similar bill respecting the securities of insurance companies, and the veto of a bill to establish a monopoly by limiting the right to construct certain street-railways to companies heretofore organized, to the exclusion of such as should hereafter obtain the consent of property owners and local authorities.



GROVER CLEVELAND.

In July, 1884, the Democratic national convention at Chicago nominated him for the Presidency of the United States, he receiving 683 votes out of a total of 820. James G. Blaine was the Republican candidate, and the canvass which followed was remarkable more for the discussion of the personal characters and qualifications of the respective candidates than for the discussion of political issues. In the election which followed, Mr. Cleveland received a majority of 37 in the electoral college, and a majority in the popular vote of 23,005 out of a total of 10,067,610.

He was inaugurated March 4, 1885, serving until 1889. On March 13, 1885, Mr. Cleveland issued a proclamation to remove the white intruders from Oklahoma, Indian Territory, and after the burning of Aspinwall, Panama, by the revolutionists, March 31, 1885, ordered a naval expedition to protect the Americans and their property. June 2, 1886, President Cleveland married, in the White House, Frances Folsom, daughter of his former law partner. With the exception of Mrs. Madison, Mrs. Cleveland was the youngest of the many mistresses of the White House, having been born in Buffalo, New York, By this union four children have been born, one, Esther, being born in the White House, September, 1893. Richard Folsom, a son, was born Oct. 28, 1897.

In 1888 Mr. Cleveland was renominated for President, but was defeated by the Republican candidate, Benjamin Harrison. Mr. Cleveland then removed to New York City to practice law. In 1892 Mr. Cleveland was again nominated for President by the Democrats, and elected over President Harrison on a tariff reform platform and campaign. Both Houses being Democratic, the Wilson bill, a tariff-for-revenue-only measure, was passed in 1894, but the Democratic party was held responsible for the hard times by the country, and the Republicans won a protective tariff victory in November, 1894, so that President Cleveland had to deal with a Republican Congress the last two years of his administration.

In the mean time, at a special session called by him, Aug. 7, 1893, President Cleveland had secured the repeal of the act of 1890, calling for the purchase of $4,500,000 of silver bullion monthly, against the opposition of the silver wing of his party, on the ground that this act was responsible for the financial depression.

In July, 1894, he ordered the United States troops to Chicago and several railroad centers to enforce the orders and process of the federal courts, and to prevent interference with interstate commerce and the mail service. His firm stand undoubtedly saved many lives and much property. Jan. 1, 1895, he announced the names of the commission, appointed with the consent of Congress, to inquire into the Venezuelan boundary. During the summer of the same year he was chosen arbitrator in the dispute between Italy and Colombia, in which the former claimed $600,000 damages sustained by Italians in the revolution of 1885.

CLEVELAND, Rose Elizabeth, sister of Grover Cleveland; born in Fayetteville, New York, in 1846; educated at Houghton Seminary, Clinton, and became a teacher in that institution, and somewhat later assumed charge of the collegiate institution at Lafayette, Indiana. She has lectured before several schools on historical subjects, and has written a book entitled *George Eliot's Poetry, and Other Studies;* and a novel entitled *The Long Run.* For a short time she was editor of *Literary Life*, a Chicago magazine.

CLEVENGER, Shobal Vail, an American sculptor; born near Middletown, Ohio, Oct. 22, 1812; died at sea, Sept. 23, 1843. His father was a weaver who went to Cincinnati with his son and apprenticed him to a stone-cutter. He at once manifested artistic ability in carving tombstone-work, and learned to hew busts in freestone. Subsequently he chose the career of a

sculptor, and as such settled in New York City. Here he made busts of General Harrison, Van Buren, Clay, Webster and other persons of distinction. Many of his works are contained in the art galleries of New York, Boston and Philadelphia. In 1840 he went to Rome, where he produced his *North American Indian*, one of the very best productions of native talent. While in Italy he became affected with pulmonary phthisis, caused by inhalation of stone-dust. He died on the Mediterranean, within a day's sail of Gibraltar.

CLEW BAY, an inlet of the Atlantic, on the west coast of Mayo County, Ireland. Old Red Sandstone, Carboniferous limestone and Cambrian strata form the shores of the bay. The upper part of the bay contains an archipelago of three hundred fertile and cultivated islets.

CLICHE, the impression made by a die in melted tins or other fusible metals. It is the proof of a die-sinker's work, by which he judges of the effect and ascertains the stage of progress as reached before the die is hardened. The same term is applied by the French to stereotype casts from woodcuts.

CLICK-BEETLE OR SPRING-BEETLE, the popular name given to many coleopterous insects of the family *Elateridæ*. They are so called from springing into the air with an audible click when placed on the back. The click is caused by striking the wing-covers against the supporting surface. The well-known wire-worms are larvæ of certain species. See COLEOPTERA, Vol. VI, p. 132.

CLIDASTES, a genus of reptiles found in the Cretaceous formation of North America. They reached a length of from 12 to 40 feet.

CLIFF-DWELLINGS. See METEORA, Vol. XVI, p. 114; and INDIANS, AMERICAN, Vol. XII, pp. 822–833.

CLIFFORD, FREDERICK, an English lawyer and author; born in 1828, practiced at the Parliamentary bar and served as assistant boundary commissioner under the Reform Act of 1867. He was the author of several important treatises on parliamentary law, his great work in this connection being his *History of Private Bill Legislation*, which is of great historical interest to students, on account of the light it throws on the social progress of Great Britain. He was also the author of interesting reports upon agricultural topics, in connection with the land and legal phases.

CLIFFORD, NATHAN, an American jurist; born in Rumney, New Hampshire, Aug. 18, 1803; died in Cornish, Maine, July 25, 1881. He adopted the legal profession, was in the state legislature from 1830 to 1834, was attorney-general of the state from 1834 to 1838, and subsequently served two terms in Congress. In 1846 he was called to President Polk's Cabinet as Attorney-General, and in this capacity he made important treaties with Mexico. California was annexed to the United States according to the terms of one of these treaties. In 1858 he became associate justice of the supreme court, and in 1877 it was his duty as senior associate judge to preside over the electoral commission of that year; and although Judge Clifford believed Mr. Tilden elected, he conducted the proceedings impartially, and the court declared for the election of Mr. Hayes.

CLIFFORD, MRS. LUCY, English novelist and relict of the late Prof. W. K. Clifford, one of the most brilliant mathematicians of the century. She comes of a family once notable in Barbados, where her grandfather, John Brandford Lane, was sometime speaker of the house of assembly. At the age of 15 Mrs. Clifford began to write stories, which in time gradually found their way into print in various magazines, and exhibited considerable talent. In 1875 she married, and four years later lost her eminent husband, when she turned her thoughts to literary work again, and published three volumes for children. She first became known to fame, in 1885, as the author of *Mrs. Keith's Crime*, a novel much talked of in its day, but since eclipsed by the popularity of her *Aunt Anne*. Besides these two powerful character-stories, and a third novel, entitled *A Flash of Summer*, which first appeared in the *Illustrated London News*, she has written a number of stories of slighter bulk, notably *A Wild Proxy; Love Letters of a Worldly Woman; The Last Touches;* and *Mere Stories.* "The main themes of her ablest writing, Mrs. Clifford always finds in her hatred of dowdyism, especially in mind, of ugly prosperity, of smugness, and of injustice."

CLIFFORD, WILLIAM KINGDON, an English mathematician; born at Exeter, May 4, 1845; educated at Trinity College, Cambridge, and was second wrangler in the mathematical tripos of 1867. He was appointed professor of mathematics and mechanics in University College, London, in 1871, holding the chair until 1879. In 1870 he accompanied the English expedition to the Mediterranean to observe the solar eclipse. On account of failing health he spent the summer of 1876 in Spain and Algiers, and in 1878 was again compelled to seek rest in Maderia, where he died, March 3d, the following year. His works include *Elements of Dynamics* (1878–87); *Common Sense of the Exact Sciences* (edited by K. Pearson, 1885); *Seeing and Thinking* (1879); and the posthumous book, *Lectures and Essays*. His mathematical and philosophical speculations were bold and brilliant. Evolution he treated from a mechanical point of view, yet finding a monistic and spiritual quality for it. He was strongly disposed toward a Berkeleyan idealism or mental phenomenonalism, and was of synthetic turn of mind. His early death removed an unusually promising speculative thinker.

CLIFTON, ROBERT BELLAMY, an English mathematician and physicist; born at Gedney, Lincolnshire, March 13, 1836; studied at University College, London, and at St. John's College, Cambridge, and graduated in 1859. In 1860 he was elected to a fellowship in St. John's College, and became professor of experimental philosophy in Owens College, which he held until appointed professor in Oxford in 1865. In 1868 he was elected a fellow of the Royal Society. He

designed and organized the Clarendon Laboratory in Oxford, the first of the kind in England. He was a member of the Royal Commission on Accidents in Mines (1879–86), and president of the Physical Society (1882–84).

CLIFTON, a town of Southern Ontario, and a port of entry, on the Niagara River, two miles below the Falls. Population 1891, 1,017.

CLIFTON SPRINGS, a health-resort of Ontario County, central western New York, on the New York Central and Hudson River and the Lehigh Valley railroads. It has large sulphur-springs and a building devoted to invalids, called the Clifton Springs Sanitarium. Population 1890, 1,297.

CLIMACTERIC YEAR, any year which marks a period of important change in the physical constitution of man. In ancient times, years denoted by multiples of the mystic numbers seven or nine received this designation, and were believed to be turning-points in health and fortune. The "grand climacteric," or most important of such years, was that denoted by the product of seven and nine, the sixty-third, and was supposed to mark the termination of an especially dangerous period. Medical authorities admit that the years indicated are critical ones.

CLIMAX, a Greek word meaning a stair, and derived from a root which conveys the idea of "sloping." In English it indicates the highest point of an ascent, or the point of greatest intensity; the climax of an oration or argument being its most impressive portion. Climax, in rhetoric, is the figure by which the speaker, in a well-arranged series of propositions, each of greater force than the preceding, gradually leads the minds of his hearers to a full appreciation of the supreme point of his discourse.

CLIMBERS, the birds of the order *Scansores*, so called from their climbing habits. See SCANSORES, in these Supplements.

CLIMBING–FERN, a name applied to a species of *Lygodium*, a genus of twining and climbing ferns growing in the tropics of both hemispheres. It belongs to the family *Schizæaceæ*, characterized by its peculiar sporangia, which are sessile, and open by a longitudinal slit, the annulus cells forming a cap. The only species of temperate regions is the slender and graceful *L. palmatum* of the eastern United States, growing in low, shady woods, and entangled among herbs. The leaflets are roundish and palmately five to seven lobed, the upper ones more compounded and bearing the sporangia on their margins. It is much prized in house-decoration.

CLIMBING–PERCH (*Anabas scandens*), a fish of the family *Anabantidæ*, found in the rivers of the East Indies. A peculiar structure retains enough water to moisten the gills for a long time, and the fish travels over dry ground without serious inconvenience. It is said to be able to ascend trees by fixing its spiny gill-covers and fins into the bark.

CLIMBING–PLANTS OR CLIMBERS, plants which seek external support to facilitate their upward growth. Some climb by means of small root-like processes growing from the stem, some by means of tendrils, some by adhering disks, and others by twining their stems around the objects to which they cling.

CLINCH RIVER, a stream 300 miles in length, one of the main headwaters of the Tennessee. Rising in southwestern Virginia, and flowing through eastern Tennessee, it unites at Kingston with the Holston River, the two there becoming the Tennessee.

CLINGMAN, THOMAS LANIER, an American politician and Confederate soldier; born at Huntsville, in Yadkin, then Surry, County, North Carolina, July 27, 1812; was graduated at the North Carolina State University at Chapel Hill, in 1832, and afterward studied law, but in 1835 entered political life as a member of the legislature of his state and became state senator in 1840. He was elected a member of the Congress of 1843–45 and of the six succeeding Congresses, being appointed to the Senate in 1858 to fill a vacancy, and elected Senator in 1861. It has been said of him, that, until he withdrew from Congress on account of the secession of his state in 1861, he never missed a day's attendance. In his early career he was an active Whig, but he became a Democrat when convinced that the Democratic party was the only one with which Southern patriots could consistently act. In 1845 he fought a bloodless duel at Bladensburg with William L. Yancey of Alabama, which grew out of remarks concerning the cause of Henry Clay's defeat. He withdrew from the United States Congress in 1861, and became a colonel and afterward a brigadier-general in the Confederate army, and participated in many battles, notably Goldsboro, Sullivan's Island, Newbern, Drury's Bluff, Cold Harbor, Petersburg and the Weldon railroad, being three times wounded. At the close of the war he surrendered with General Joseph E. Johnston and sought to build up the waste places of his section. In 1868 he was a delegate to the national Democratic convention. From his home at Asheville he wrote important contributions to the mineralogical and geological knowledge of his state. In 1855 he ascended and measured the mountain known as Clingman's Peak, and in 1858 that known as Clingman's Dome, which was named after him. It is the highest peak of the Great Smoky Mountains (6,660 feet). He published an able defense of religion against the attacks of science, a volume of his own speeches, and *Follies of the Positive Philosophers* (1878). Died at Morgantown, N. C., Nov. 3, 1897.

CLINKSTONE. See GEOLOGY, Vol. X, p. 234.

CLINOMETER, an instrument for taking the dip and strike of a stratum, the grade of a railway track, or the like. It consists of a compass provided with a small spirit-level and having on the lid a small graduated arc and a plumb-line. The name is applied, also, to several devices operating on a similar principle, and used for determining angular elevation or depression. One form, having a bar with sliding points, is used

in craniometrical determination of the facial angles.

CLINTON, a town, capital of Van Buren County, north-central Arkansas, is situated on Little Red River, 60 miles N.W. from Little Rock Population 1890, 176.

CLINTON, a town of Huron County, southwestern Ontario, Canada, is situated on a branch of the Grand Trunk railroad, 12 miles S.W. of Goderich, the county seat, and has a collegiate institute, two newspapers, a number of factories, and several salt-wells. It is the headquarters of the Canada Salt Association. Population 1891, 2,635.

CLINTON, a village, capital of Jones County, central Georgia. Estimated population of the village, 250; population of the militia district in 1890, 536.

CLINTON, a city, capital of Clinton County, eastern Iowa (see CLINTON, Vol. VI, p. 7), has had a large growth, and is an important point for the distribution and manufacture of lumber. It has eight daily and weekly newspapers, and is equipped liberally with banks, schools, public library, etc., besides saw-mills, paper-mills, iron foundries, chair factories, railway repair-shops, flour-mills, canning-works, and asphaltum-works. An iron railroad bridge four thousand feet in length spans the Mississippi at this point, and the facilities for rail and river transportation are abundant. Population 1880, 9,052; 1890, 13,619.

CLINTON, a city, capital of Hickman County, southwestern Kentucky; a station of the Illinois Central railroad; has a bank, several churches, and flour and lumber industries. Population 1880, 506; 1890, 1,347.

CLINTON, a cotton-shipping town, capital of East Feliciana Parish, southeastern Louisiana; is connected by a 25-mile railroad with Port Hudson, on the Mississippi River. Population 1890, 974.

CLINTON, a manufacturing city of Worcester County, central Massachusetts, and an important railroad junction. (See CLINTON, Vol. VI, p. 7.) Among the chief products are ginghams, plaids, carpets and machinery. The Lancaster Mills here employ over 1,500 operatives. Population 1880, 8,029; 1890, 9,626.

CLINTON, a town of Hinds County, south central Mississippi, about 10 miles W.N.W. of Jackson; is the seat of Mississippi College and of the Central Female Institute. Population 1890, of the "beat," or district, 6,711.

CLINTON, a city, capital of Henry County, west-central Missouri, is situated on the Missouri, Kansas and Texas railroad, about 75 miles S.E. from Kansas City. It has two colleges, a pottery, tile-works, rolling-mills, etc. Population 1880, 2,628; 1890, 4,737.

CLINTON, a village of Oneida County, central New York, about nine miles S.W. of Utica; is chiefly known on account of its educational institutions, which include Hamilton College, two seminaries for girls, and an academy. Quarries of flag and building stone are in the vicinity. Population 1890, 1,269.

CLINTON, a town, capital of Anderson County, eastern Tennessee, situated at the crossing of the Clinch River by the Southern railroad. It is in a productive cotton, grain, and peanut raising region, and it has flour and sawmills, a foundry and a tool-handle factory. It has steamboat connections with points farther down the river. Population 1890, 1,198.

CLINTON, CHARLES, an American colonist, ancestor of the Clintons in the United States, was born in County Longford, Ireland, 1690, his grandfather, William Clinton, having been an officer in the army of King Charles the First. In May, 1729, he chartered a vessel to take himself and a party of friends to America. They reached Cape Cod in October of that year, but he removed to Ulster County, New York, in 1731, where he became a county judge and colonel of militia. In 1758 he was appointed lieutenant-colonel of De Lancey's regiment and served in the expedition under Bradstreet against Fort Frontenac. He died in 1773.

CLINTON, GEORGE, a British admiral; colonial governor of Newfoundland, 1732–41, and of New York, 1741–51. He was a son of the sixth earl of Lincoln, and the father of Sir Henry Clinton. After leaving New York he was made governor of Greenwich Hospital. In 1745 he became vice-admiral of the red, and, twelve years later, admiral of the fleet. He died July 10, 1761.

CLINTON, GEORGE, an American statesman and general, son of Charles Clinton; born in Ulster County, New York, July 26, 1739; died in Washington, District of Columbia, April 20, 1812. His early military training consisted of a privateering cruise and service as lieutenant in the expedition against Fort Frontenac. He was a member of the New York assembly, and of the Continental Congress prior to and during the Revolutionary War, and also of the constitutional convention of New York in 1777. In 1777 he was made brigadier-general in the Continental army, and in the same year he and his brother James made a brave defense of Forts Clinton and Montgomery, on the Hudson, at the time of their capture by the British. He became first governor of New York, and was re-elected many times. He was a Whig leader in politics, and a vigorous defender of his state against the incursions of hostile Indians, the encroachments of neighboring states, and the uprisings of turbulent spirits opposed to law and order. He first conceived the idea of utilizing the waterways of his state for canal transportation, and the Erie canal was the result. In 1804 he was chosen fourth Vice-President of the United States, Jefferson being President. In 1808 he was re-elected, with Madison for President, and in 1811, by his casting-vote, he defeated the project for continuing the United States Bank beyond that year.

CLINTON, SIR HENRY, an English general who had command in America during the Revolutionary War. He was born in 1738, being the only son of Admiral George Clinton, who was colonial

governor of New York from 1741 to 1751. His first military service was as captain-lieutenant in the New York "companies," as the militia was then called. In 1751 he accompanied his father to England, and in November was gazetted lieutenant in the Coldstream Guards. In April, 1758, he was promoted to the Grenadier Guards as captain and lieutenant-colonel. His first active service was in 1760, and from that date until the close of the Seven Years' War he won great distinction in the Hanoverian campaigns. He was wounded at Johannesberg, Aug. 30, 1762; became colonel of the Twelfth Regiment in 1766; and major-general, May 25, 1772. In 1775 he was sent to America, and it was he who commanded the final charge at the battle of Bunker Hill and won the day for the British, for which service he was made local lieutenant-general in September of that year. In the winter of 1776 he started upon an expedition to save North Carolina for the king, but, owing to the tardy arrival of the co-operating fleet, changed his purpose, and made, in June, an unsuccessful attack upon Fort Moultrie, South Carolina. Having returned to Staten Island, he rendered such services at the battle of Long Island and at the subsequent occupation of New York in August and September, that he was promoted lieutenant-general and created a knight commander of the Bath. In 1777 he captured Forts Clinton and Montgomery, on the Hudson, in an attempt to make a diversion in favor of General Burgoyne. In 1778 he succeeded Lord Howe in chief command of the British forces in North America, in which position he became a leading actor in all the stirring events which led up to the surrender of Cornwallis in 1781, after which disaster he returned to England. Elected member of Parliament in 1782–84, he was afterward made governor of Limerick, and in 1793 governor of Gibraltar, at which post he died, Dec. 23, 1795.

During the latter part of the Revolution there was much ill feeling between Sir Henry Clinton and Lord Cornwallis, his second in command, who aspired to supersede him, and who charged his chief with not rendering efficient support in important undertakings. This led Sir Henry to publish a *Narrative of His Conduct in America* (1783); *Observations on Earl Cornwallis's Answer to the Narrative* (1783); and *Observations on Stedman's History of the American War* (1794).

CLINTON, James, an American general; born in Ulster County, New York, Aug. 9, 1736; died in Orange County, New York, Dec. 22, 1812. During the war of 1756 between the English and French, he served as captain under Bradstreet, and in consideration of services rendered at the capture of Fort Frontenac was appointed captain-commandant of four regiments levied for the protection of the western frontiers of Ulster and Orange counties, New York. In 1775 he became colonel of the Third New York Regiment, and in 1776 was made brigadier-general. In 1777 he made a brave defense of Fort Clinton against the British attack, and was wounded, but after the taking of the fort escaped personal capture by a brilliant dash. In 1779 he distinguished himself in Sullivan's campaign against the Indians, and at the close of the Revolutionary War he was present at the siege of Yorktown and at the reoccupation of New York. He subsequently served as commissioner to adjust the boundary line between Pennsylvania and New York, as a member of the New York legislature, and of the convention which adopted the constitution of the United States.

CLINTON GROUP, a name given by American geologists to a subdivision of the Upper Silurian series. The group is of special interest, as containing important deposits of iron ore. The name is given with reference to the town of Clinton, New York.

CLINTONITE, a reddish-brown mineral found at Warwick, New York. See Mineralogy, Vol. XVI, p. 413.

CLINTON ORES. See Iron and Steel, in these Supplements.

CLIO, in Grecian mythology, the fabled daughter of Jupiter and Mnemosyne. She was the Muse of history and epic poetry, and was represented as bearing a half-opened roll. See also Muses, Vol. XVII, p. 74.

CLIO or CLIONE, a genus of shell-less pteropodous mollusks, family *Clionidæ*, of which one species, *C. borealis*, is extremely abundant in the arctic seas, and constitutes a principal part of the food of whales. See illustrations under Mollusca, Vol. XVI, p. 667.

CLISTHENES, an Athenian statesman and reformer. See Greece, Vol. XI, p. 97.

CLITUS, a Macedonian general, and friend of Alexander the Great. See Alexander, Vol. I, p. 483.

CLITZ, Henry Boynton, an American soldier; born at Sackett's Harbor, New York, July 4, 1824; was graduated at West Point, 1845; assistant instructor there from 1848 to 1855; gained a brevet for service in the Mexican War, and at the outbreak of the Civil War took part in the defense of Fort Pickens, Florida, and continued in active service until July 1, 1885, having by successive promotions attained the rank of brigadier-general. He was last seen at Niagara Falls, Oct. 30, 1888.

CLIVE, Kitty, an English actress of slender education, but unblemished character, and noted for her wit; born in London in 1711; died at Little Strawberry Hill, Dec. 6, 1785. Her father was an Irish lawyer named Raftor, who had settled in the metropolis. Her first appearance was in 1728 at Drury Lane, where she continued chiefly to play until she retired in 1769. About 1731 she married George Clive, a barrister, from whom she soon separated. She was a favorite in literary society, and much admired by Garrick, Handel and Horace Walpole. Dr. Johnson said that in sprightliness of humor he had never seen her equaled. Her portrait by Hogarth is well known, and she was the author of four small dramatic sketches, *The Rehearsal; or,*

Boys in Petticoats (1743), being the only one printed.

CLOACA, a term used in anatomy to designate the common chamber into which the intestine, the urinal and the genital ducts open, and which in turn communicates with the exterior. Such is the condition in all vertebrate embryos, and the cloaca persists during adult life in some fishes all amphibia, reptiles, birds, and the lowest mammals (*Monotremata*). In other vertebrates the urino-genital openings become separated from that of the alimentary canal.

CLOACA MAXIMA (see ROME, Vol. XX, p. 814), the most important sewer of ancient Rome, constructed in the time of the Tarquins to drain the Velabra swamp, which lay between the Palatine and Capitoline hills. It was flushed by an unceasing stream from the aqueducts. Large portions of it still remain.

CLOCK, ELECTRIC. Electrically controlled clocks are popularly known by this name. Alexander Bain of Scotland is credited with being the first to construct such clocks, about 1840. R. L. Jones of Chester, England, improved them materially, and built a number. The principle involved is, that one accurate clock is connected by wires with other clocks which it is desired to control and keep in exact time with the first. The pendulum of the principal clock is arranged then to make and break a circuit at each stroke, or at stated intervals, so that the subsidiary clocks beat in the same time. C. V. Walker of Great Britain introduced a form of these clocks in many of the larger telegraph-offices of England. A cheaper and simpler form of electrically controlled clock is now manufactured, being constructed on the principle of periodic synchronization. The clock to be controlled is made to run slightly fast, or at least so that in its variations it will never run slow. A device of levers is arranged then in connection with the second-hand, and at intervals, say of one hour, an electric impulse is sent from the controlling clock, so as to cause an electro-magnet to operate an armature and pull a lever adjusting the second-hand back to the correct point, should it have gained any during the hour. Another system consists of a master clock and a number of clock faces electrically connected. At the expiration of each minute an electric impulse is sent out from the master clock through the different circuits, and the hands of the controlled clocks advance one minute at a stroke. C. H. COCHRANE.

CLODIUS, PUBLIUS, a profligate Roman patrician of the time of Cicero. His correct name was Publius Claudius, and he had the soubriquet of Pulcher, being a son of Appius Claudius Pulcher the Prætor, who was an adherent of Sulla, and perished in the great battle before Rome, 82 B.C. At the outset of his career, while serving in Asia under his brother in law, Lucullus, he fomented a mutiny from motives of personal pique, and throughout his subsequent varied experiences, naval, military and political, he was repeatedly and unscrupulously guilty of bribery and extortion. At his trial, 61 B.C., for having profaned the mysteries of Bona Dea, he conceived an implacable hatred for Cicero, whose oratory and testimony were directed against him, and whom he succeeded in driving into exile, 58 B.C. He subsequently cherished a deadly feud with Milo for obtaining Cicero's recall from exile, and at an accidental meeting with Milo, 52 B.C., Clodius was killed.

CLOGHEEN, a town in the southwest part of Tipperary County, Munster, Ireland; situated on the River Tar, 13 miles S.W. from Clonmel; is in the midst of a wheat-producing locality, and has extensive flour-mills. The famous limestone caves of Mitchellstown are six miles northwest. Population, 1,317.

CLONES, a town of Monaghan County, Ulster, Ireland, is situated on the Ulster canal, 11 miles S.W. from Monaghan. It contains the ruins of an ancient monastery and of a round tower, and has manufactories of linen, and corn-mills. Population, 2,170. See MONAGHAN, Vol. XVI, p. 718.

CLONFERT, an ancient episcopal city of Ireland, in the extreme east of County Galway. Population, 2,200. The bishopric was founded in the sixth century. There is another Clonfert, a parish in County Cork.

CLONTARF, a town in the county of Dublin, about three miles N.E. of Dublin city. Clontarf is celebrated in history as the place where, in 1014, Brian Boroihme won a great victory over the Danes, a battle forming the subject of Gray's ode, *The Fatal Sisters*. Spear-heads and other parts of ancient weapons are still occasionally dug up, many such being preserved at Trinity College. It is now a resort and bathing-place. Population, about 4,000.

CLOSE is a technical legal term meaning land or an interest in land. Strictly speaking, it means an inclosed parcel of land, but if no actual inclosure exists, the boundary line is a sufficient inclosure to make it a close within the meaning of the law. In every case where one person has the right to exclude another from his land, he is entitled to compensation for the damages sustained on account of the passing of another upon his land without his permission, which act of trespassing upon the land of another is termed a breach of the close.

CLOSSE, RAPHAEL LAMBERT (1620–62), a Canadian soldier. In 1642 he was made sergeant-major of the garrison of Montreal, and soon became noted for his skill in fighting the hostile tribes. In 1658 he received the fief of St. Lambert as a reward for his services, and in 1672 another was bestowed upon his widow. He was killed while trying to rescue some workmen who had been attacked by Iroquois.

CLOSURE, the power, in certain circumstances, of terminating a debate in a legislative body, although there are members anxious to carry it on for an indefinite period. The British House of Commons is the model on which all similar deliberative assemblies have been formed; yet sooner or later every one of these finds it impos-

sible to carry on the business brought before it unless it assumes the power of deciding when a debate has lasted long enough, and should terminate. Many years went by, and still the good sense of the successively defeated minorities in the British House of Commons rendered it unnecessary to take any steps for the curtailment of superfluous debate. Not until nearly four fifths of the nineteenth century had run its course was any serious desire felt on either side of the House to alter this happy state of things. Shortly before that time, however, the device of obstructing, simply for obstruction's sake, began to be cultivated as an art, and was brought, in a brief period, to high perfection. Day by day, time was intentionally wasted by small minorities of the House, and oftener than once, when the members wished to go home, a section of the Irish representatives forced upon them "an all-night sitting." In these circumstances William E. Gladstone, then Prime Minister, took steps to grapple with the difficulty, and commenced the Parliamentary session of 1882 with new rules for the conduct of business, which he believed would preserve the rights both of majorities and minorities, while materially diminishing obstruction. The first rule gave permission to the Speaker, or to the chairman of a committee of the whole House, to close a debate and go on to vote on a question, if, when a motion to that effect was carried by a majority, its supporters appeared to amount to two hundred, or in the event of the minority being less than forty, to amount to more than one hundred. The proposed system was at first called the cloture, but was afterward exchanged for its equivalent, closure.

In the Congress of the United States the practice has been to allow unlimited debate, and it is for this reason that we have so many instances of obstructionary tactics being resorted to by a minority to delay the passage of a measure. These tactics have been given the general name of "filibustering," and include almost every expedient known to parliamentary tacticians, not even omitting serious breaches of decorum. The rule of closure adopted by the British Parliament finds a simile in America in the movement of the previous question.

CLOTHAIR I OR HLOTHAR I, a Merovingian king of the Franks, born A.D. 497; was the youngest of the four sons among whom Clovis divided his dominions. See FRANCE, Vol. IX, p. 530.

CLOTHAIR II OR HLOTHAR II, king of the Franks, son of Chilperic and grandson of Clothair I; inherited the kingdom of Soissons, A.D. 584, and by A.D. 613 had united again in one dominion the scattered kingdoms of his ancestor Clovis. See FRANCE, Vol. IX. pp. 530, 531.

CLOTHES-MOTHS (*Teneina*), the smallest of the *Lepidoptera*. See BUTTERFLIES, Vol. IV, p. 597.

CLOUDBERRY (*Rubus Chamæmorus*), a plant related to the bramble, although of very different appearance, having an herbaceous single-flowered stem destitute of prickles. The plant is eight to ten inches in height; the leaves few, large, lobed, and kidney-shaped; the flowers large and white; the fruit orange-red, equal in size to a bramble-berry and of an agreeable flavor. It is a native of the northern parts of Europe, Asia and America. The fruit is valued highly.

CLOVE-BARK, a commercial bark which is formed of several pieces of thin and hard bark, rolled up one over the other. It has a deep brown color, and a taste similar to that of cloves. It possesses properties analogous to those of cinnamon.

CLOVER OR TRIFOLIUM. See AGRICULTURE, Vol. I, pp. 375, 376.

CLOVIS, a king of the Franks, grandson of Merovig, from whom the Merovingian kings take their name; born about A.D. 466; succeeded his father, Childeric, in 481, overthrew the Gallo-Romans under Syagrius in 486, and established himself at Soissons. In 493 he married Clotilda of Burgundy, under whose influence, in 496, he became a Christian. From that time his power and fortunes increased, and the distinctive glory and history of France as a Christian nation began. His character was fierce, cruel and energetic. He died A.D. 511, and his kingdom was divided between his four sons, Thierri, Chlodomir, Childeric and Clothaire. See FRANCE, Vol. IX, pp. 528, 529.

CLOWES, WILLIAM C. (1540–1604), an English surgeon who served with Leicester in the Low Countries, and also on board the fleet that defeated the Spanish armada. He became surgeon to the queen, and after a prosperous practice in London retired to a country house in Essex, where he died in 1604. He was the author of several books, two of which were long popular: *A Prooved Practice for All Young Chirurgians* (1591) and *A Treatise on the Struma* (1602).

CLUB. (For origin, early history, and European character see CLUB, Vol. VI, pp. 38 et seq). The many varieties of clubs, with the increased opportunities and advantages of club-life, have been multiplied so in American and European cities within the past generation that the social influence and results of these popular adjuncts to our modern civilization have become matters for serious consideration. It cannot be denied that clubs form a useful supplement to the home-life of many persons in every community who do not belong to the leisure class; but it is not so certain that the leisure class itself, whose members are the chief patrons of the fashionable clubs in large cities, receives benefits therefrom which outweigh the attendant disadvantages.

It was in England, after the termination of the Napoleonic war, that the modern club as a factor in city life began its career. London suddenly became the abode of numerous unemployed army officers, whose slender means, social tastes and love of good cheer compelled economy. Clubs were formed among them, which were not merely "assemblies of good fellows meeting under certain conditions," as described by Dr. Johnson.

but which combined a "union of forces with a division of expenses" in an effort to pursue the art of living. Such an origin had the "United Service," one of the oldest of the great London clubs of to-day.

Twenty years later the taste for club-life found its way to America, the Union Club of New York and the Somerset Club of Boston being among the first established. Increase of wealth and growth of population have produced a large class of persons to whom club-life seems most attractive and advantageous, and the social club, as ordinarily understood, has been multiplied accordingly. The club idea is, however, no other than the co-operative idea which is familiar to all classes of every English-speaking community; and it has been utilized freely, not only in establishing clubs of the grade already mentioned, but town and country clubs and athletic clubs, having houses and grounds where both both out-door and indoor sports may be pursued in connection with the usual refinements and adornments of city life. Clubs for lessening the expense of living at the seaside, mountains, lakes and summer resorts are but another and very natural development of the same idea; and so, also, are the better class of bicycle clubs, with their fine houses and luxurious appointments, which abound in our chief cities. A list of the various kinds of clubs now in vogue might be extended indefinitely. Every city and considerable town has its club, wherein the social idea is uppermost; and clubs for political, religious, educational or other special purposes, and those in which the social idea is subordinate, are quite as familiar. Should the old-fashioned home-life disappear under such social conditions, it may yet be hoped that many of its attractive features may be transferred to the artificial home, or club.

CLUBBING, in cabbages, turnips and other plants of the genus *Brassica*, a diseased growth of tubercular excrescences in the upper part of the root or lower part of the stem, caused by the larvæ of the cabbage-fly and of the other insects, by which the vigorous growth of plant is prevented and crops are often much injured.

CLUB-MOSSES. See LYCOPODIUM, Vol. XV, p. 94.

*CLUBS, WOMEN'S. The most remarkable development in modern civilization has been achieved through associations. Men long ago discovered the benefit of organization in finance and in all the trades and professions. Women, however, having lived a more or less solitary or individual life, are awakening to the power of union within a few years. The church had organized women as early as the second and third century, and most of the practical charity of the Greek and Roman Catholic churches was carried on exclusively by women. The Roman Catholic Church has made of practical charity a career for women, and always has rewarded the women who showed executive ability by committing great interests to their charge, by covering them with honors and conferring on them great authority. No more interesting chapter in the history of woman's development could be written than that treating of the work of women and the honors they have achieved in the Roman Catholic Church, where they have been distinguished especially for executive ability and sound financial management. The Protestant communities followed the example of Mother Church, and to-day the practical charity of all Christian communities is in the hands of women. The deaconesses of the Methodist, the sisterhoods of the Anglican Church, the home and missionary societies of all the churches, the orphan asylums supported by denominations, are controlled by them. The Salvation Army, the most democratic and latest phase of religious organization, depends mainly for its success on the labors of the sisters, and Mrs. Ballington Booth, in speaking of the position of women in that organization, says that "no church organization will ever succeed in the future that does not give to women not only the spiritual but the material reward of their labors. So much for the organization of women in the religious world. The spirit of association distinguishes to-day non-sectarian as well as sectarian philanthropy. Conventions are being held all over the country for prison reform, the reform of penal institutions, union missionary meetings, temperance societies—in a word, all the great philanthropic movements depend largely for their success on association, and in most of these associations women are the leaders.

In the educational world the same tendency is noted. Teachers' conventions are held not only in every state, but there is a national and international educational association. Women are members of all these associations. That they appreciate what unity can accomplish is shown by the fact that, no matter how small the salary of a teacher, she is usually willing to spend a good part of it to attend these great conventions. Teachers' clubs are being formed all over the country, many of these clubs joining state federations, thus bringing the teacher in communion with the intelligent women of the community. The great summer schools are another phase of the association idea. Those at Chautauqua, Bay View, Mt. Eagle, and hundreds of others, meet regularly every year with an ever-increasing number of students in attendance, the larger number of whom are women. University Extension is another phase—the effort of the university to bring itself into communion with the laity. The number of women far exceeds that of men in attendance on the courses of University Extension.

While women excel in religious, educational and philanthropic associations, they are very backward in industrial organization, and in England trades-unionism has made far greater advance than it has in this country. The only unions of any great importance in America among women are those of the shirt-makers and garment-makers of Troy and Rochester, New York, and the laundry-workers of Cleveland, Ohio. The

*Copyright, 1897, by The Werner Company.

bindery-girls of Chicago are organized fairly well, but the timidity of women in uniting for industrial advantages is one of the dangers which threatens their position in their economic independence. Even when well organized, they seldom take the initiative, and are never aggressive. The policy of men's trades-unions is extremely liberal toward women, but the women appear to distrust them, and hold aloof. During several strikes in this country the women have gone out with the men, and have overcome their constitutional timidity to the extent of standing courageously to the law of the union, but these cases are few and far between. Woman's hope in this line of organization must come through the working-girls' clubs, hundreds of which are formed and being formed all over the country. They are becoming a wonderful factor in broadening the social and industrial consciousness of their members. When the working-girls' clubs of New York were organized, trades-unionism was tabooed, even discussion was not allowed. At the last convention held in Boston in 1894 this subject was very prominent, and when several of the older women objected to the discussion of trades-unionism, the younger and more liberal members were so indignant that it was with difficulty that the convention continued in harmony. Many of the working-girls' clubs are assuming the character of benefit associations, and one of the most radical, the Aloha Club of Chicago, is not only a benefit association, but has purchased a summer home in which each club member is privileged to pass four weeks during the summer season. The members have paid for their home, and have in contemplation building a new and improved clubhouse.

During the last twenty years several great organizations of a social and educational trend have been inaugurated in this country. The Ladies of the Maccabees is an enormous association, numbering about seventy thousand women. It has several features of a benefit association connected with it, and is a secret organization. It is said to be very well conducted, on a sound financial basis, and has a large capital. Of patriotic associations, the Women's Relief Corps and the Daughters of the American Revolution are good examples. The mother association was the Society for the Advancement of Women, of which Mrs. Julia Ward Howe was for many years the president. This association came into being about twenty-five years ago, and has held meetings all over the country, being a sort of school to teach association. The National Council of Women is an as sociation meeting every three years in Washington. Only national associates are eligible to membership. Among the prominent associations in membership are the Women's Christian Temperance Union, The Women's Relief Corps, the Suffrage Association, the National Council of Jewish Women, and the Federation of Afro-American Women.

The most recent organization is the General Federation of Women's Clubs. This organization, which was founded in 1892 at a meeting held in New York on the invitation of Sorosis, now numbers over 490 clubs, and 20 state federations with 947 clubs. It is estimated that nearly a million women are thus members of the general federation. These clubs can be classed as literary, educational, philanthropic, social, economic, and many have departments on the home and finance. Some of the clubs are very large, the membership numbering many hundreds. Others are small, the membership not exceeding thirty or forty. The meetings of the general federation are biennial, while the meetings of the state federations are annual. Many of the state federations have adopted a specified line of work. Maine has the visitation of the public schools to establish kindergartens and school libraries a duty; Michigan has adopted the study of household economics; New York, public education; Ohio and Iowa, establishing public libraries; Minnesota, township and village improvement associations; Colorado, civic clubs; the District of Columbia, the reform of laws affecting women and children in the district, and the public-school system. The aim of the federation is distinctly educational and philanthropic. The most recent phase of its development is city federation. These federations are divided into departments which cover the whole interests of a city. Among the most progressive federations are those of Beloit, Detroit, Cincinnati, Jackson (Michigan), Minneapolis, and the Civic Club of Philadelphia. These clubs virtually take charge of all the interests of the cities in which they are found, the beautifying and improvement of a city being the chief aim. Denver has a federation of the civic clubs which institutes all manner of reform, especially in connection with education.

The aim of the federation idea is to raise the average standard of life and to broaden the social aims of the community, and it is pledged to accomplish this, not through prohibitory or arbitrary means, but by non-aggressive and educational methods. To these methods it stands pledged by its motto, "Unity in diversity."

From this brief summary of organization the conclusions may be drawn that women are more prone to organize along the lines of philanthropy and education than on those of industrial and material benefit. Following out the instinct of the sex, which is the altruistic instinct, it has its foundation in her province of the mother to protect the weak. To put into practical action the doctrines of Christianity is her *rôle* in modern civilization. These altruistic organizations have a great economic value. The modern woman is capable and restless, and is determined to have a field for her energies. Did not these organizations exist, which claim so much of her time and energy, she would invariably enter into the competitive struggle for existence, and the world would thus lose the benefit of the intelligent action of the highly developed modern woman. Nothing could be worse for society than to have women take an entirely materialistic view of their

position, and every effort should be made to encourage, rather than discourage, those organizations which turn her thoughts and energy toward the bettering of humanity, and away from the purely financial and materialistic point of view of her life and its duties.

ELLEN M. HENROTIN.

CLUNES, a borough of Victoria, Australia, 119 miles N.W. of Melbourne. Gold-mining and grazing are the chief industries. Population, 3,574.

CLUNIACS OR THE CONGREGATION OF CLUGNY, one of the most important of the many religious orders into which the widespread order of St. Benedict was divided ultimately. It was founded early in the tenth century, and took its name from the town in France in which its abbey was located. The monastic rule of St. Benedict, based on the cardinal principles of labor and obedience, had fallen into scandalous neglect, although that order had increased in power and numbers so as to overspread the whole of Europe, when, in A.D. 910, William of Aquitaine founded and endowed the monastery of Clugny, which he designed should present an example of strict and conscientious religious observance. The times were so ripe for reform, and the benefit of rigorous discipline so apparent, that numerous other monasteries, drawn to imitate the virtue of Clugny, affiliated themselves therewith, until its jurisdiction penetrated Britain, France, Germany, Spain, Italy, and even the East. In A.D. 946 the pope exempted Clugny from diocesan jurisdiction, and subjected it to the immediate supervision of the Holy See. But lapse of time and change of leaders again and again brought relaxation of discipline, which in turn gave way before a renewed spirit of reform. Such a movement in the seventeenth century, instigated by Cardinal Richelieu, resulted in rules, known as the "Strict Observance of Clugny," which impressed their beneficial influence upon monastic life even outside the order. For over eight hundred years did this religious body receive favor and emoluments from princes and popes, and intermittently cast the light of its example upon the religious world, and dispensed its benefits to the poor and suffering, down to the outbreak of the French Revolution, when its doors were closed, its property confiscated, and its life destroyed by "the people of France." The Cluniacs afford the first instance of an order which was founded within the limits of one already existing, and of which it continued to form a part. Their palmiest days were in the twelfth century, when the order was very brilliant and powerful. Among their great men were the popes Gregory VII, Urban II and Paschal II. See ABBEY, Vol. I, pp. 14, 15; and CLUNY, Vol. VI, p. 43.

CLUPEIDÆ, a formerly recognized family of fishes, nearly allied to the *Salmonidæ*. In this family the herring, pilchard, anchovy, sardine, etc., were included, but it is now subdivided into several families.

CLUSERET, GUSTAVE PAUL, a French soldier of fortune; born in Paris, June 13, 1823; was educated at the military school of St. Cyr, and soon after entering the army, received the cross of the Legion of Honor for valor during the revolution of February, 1848; he afterward served in the Crimean War, followed Garibaldi, and rose to the rank of lieutenant-colonel on the general staff of the army of Italy. In 1861 he came to America and served in the Union army under Frémont and McClellan, and was successively promoted to be colonel and general. After the war he established a newspaper in New York to advocate the candidacy of General Frémont for the Presidency; and after the election of General Grant he returned to Europe to take part in the Fenian insurrection. He next appeared in France, where his violent articles against the government caused his arrest, but he escaped punishment on the plea of being a naturalized American citizen. In 1872 he settled in Switzerland, and in 1881 returned to France. As editor of *La Commune* and of *La Marseillaise*, he again incurred the hostility of the French government and was obliged to leave the country. In 1884 he once more returned, and, while devoting himself to painting, wrote and published *Memoirs of the Second Siege of Paris* (1887), in which he sought to justify the Commune. He subsequently was elected a member of the National Assembly by the Radical party. Among his paintings exhibited in the Salon are *Sunrise* (1888) and *Yldiz, Palace of the Sultan* (1890).

CLUSIA, a tropical American genus of shrubs and trees of the family *Guttiferæ*. *C. rosea* yields an abundant resin, which is used as an external application in veterinary medicine, and for covering boats, instead of pitch. *C. insignis*, the wax-flower of Demerara, is used to make a stimulating and soothing plaster. Several of the species are epiphytes, growing upon the larger trees.

CLUSONÉ, a town of Lombardy, northern Italy, situated near the left bank of the Serio. It has manufactories of linen, a trade in corn and iron, and in the vicinity are copper foundries and vitriol-works. Population, 3,878.

CLYDE, a village, capital of Bryan County, southeastern Georgia, about 18 miles W. from Savannah. Population, 2,327.

CLYDE, a village of Wayne County, north-central New York, is situated on the Clyde River, 38 miles W. of Syracuse, and has manufactures of glass, steam-engines and farming implements. Two railway lines and the Erie canal give ready access to markets for its products. Population 1890, 2,638.

CLYDE, a town of Sandusky County, northern Ohio, is situated on the Erie and Lake Shore railways, 17 miles S.W. from Sandusky. Its manufactures include flour, edge-tools and pianos. It is in the center of a rich agricultural region, and has water-works supplied by an artesian well.

CLYMER, GEORGE, an American statesman, signer of the Declaration of Independence, was born at Philadelphia in 1739; inherited from an uncle a comfortable fortune; in 1773 became a bold advocate for American rights, and was a member of the Council of Safety. He was also

one of the first Continental treasurers; a member of Congress in 1776 and 1780; of the Pennsylvania legislature in 1784, of the constitutional convention in 1787, and of the first United States Congress in 1788. In 1796 he withdrew from public life. He died at Morrisville, Pennsylvania, Jan. 23, 1813.

CLYMER, MEREDITH, an American physician, born in 1817. He graduated in medicine in 1837, and subsequently studied in London, Paris, and Dublin. He began practice in Philadelphia, but shortly afterward removed to New York. He accepted the position of professor in several colleges, among them being the University of the City of New York and the Albany Medical College. During the Civil War he was surgeon of United States volunteers. He has written numerous works on medical subjects, among which may be named *Ecstasy and other Disorders of the Nervous System; Hereditary Genius; Cerebro-Spinal Meningitis;* and *The Legitimate Influence of Epilepsy on Criminal Responsibility.*

COAHUILA, one of the most northerly of the 27 states which are included in the Mexican Republic. On the north it is separated from Texas by the Rio Grande; Nueva Leon and a few miles of Tamaulipas bound it on the east; San Luis Potosi and Zacatecas on the south; Durango and Chihuahua on the west. The state has an area of 63,569 square miles, is generally mountainous, is rich in minerals and pasturage, and has several cotton factories and a large number of flour-mills in operation within its borders. A branch of the Mexican Central railway extends from Torrejon, on the borders of Durango, in the southwest, to Ciudad Porfirio Diaz, on the Rio Grande, opposite Eagle Pass, Texas, on the north, making connections at Spofford and at San Antonio, Texas, for all portions of the United States. Saltillo is the capital, with a population of 26,000. Estimated population of the state in 1891, 177,800.

COAHUILTECAN INDIANS, a nearly extinct tribe of North American Indians who formerly inhabited the lower part of the Rio Grande valley, in Mexico, the province of Coahuila and some adjoining territory. They form a distinct linguistic stock, and when first known embraced 25 tribes. In 1886 only three of the tribes were extant, numbering less than a score of individuals, none of whom then lived within the borders of the state of Coahuila, and most of whom had forgotten their language and traditions.

COALFISH (*Mertangus carbonarius*), a fish allied to the cod, found in arctic waters. The skin contains a black pigment which is easily rubbed off when the fish is handled. The liver of the fish furnishes an oil which is used for many purposes. The pollock belongs to the same genus.

COALITION, in politics, a term applied to the union of two parties, or, as usually happens, portions of parties, who agree to sink their differences and act in common. The English ministry known as the Great Coalition was formed in 1782, when Fox, the leader of the reformers, took the office with Lord North, the leader of the opposite party. The term is also used of alliances between separate states. Of these, the coalitions formed at different times by other European nations against France are among the most famous in history.

*COAL-MINING IN THE UNITED STATES. For the general subject, see COAL, Vol. VI, pp. 45–81.

Of the 50 states and territories, including Alaska, of the American Union, 35 are underlaid, in part, by coal-measures. Of this number, 29 are producing coal in commercial quantities. Massachusetts, Rhode Island, Nebraska, South Dakota, Arizona and Nevada have coal-beds, though, either from their poor quality or remoteness from lines of transportation, little or no coal is mined therefrom.

The area of the coal-fields has not been determined positively, and in many individual cases no approximations as to these areas have been attempted. In the older states, however, where geological surveys have been made and are in progress, these areas have been determined.

For convenience of reference, the coal-fields have been classified. This classification, together with the determined areas, the annual production and number of employees in 1894, is given in the following table, compiled from the reports of the United States Geological Survey.

CLASSIFICATION OF THE COAL-FIELDS OF THE UNITED STATES.

	AREA. SQ. MILES.	PRODUCTION. SHORT TONS.	NO. EMPLOYEES.
Anthracite.			
New England (Rhode Island and Massachusetts)	500		
Pennsylvania	480	51,921,121	131,603
Colorado and New Mexico	15	71,550	
	995	51,992,671	
Bituminous (*a*).			
Triassic:			
Virginia	180	52,079	
North Carolina	2,700	16,900	95
	2,880	68,979	
Appalachian:			
Pennsylvania	9,000	39,912,463	75,010
Ohio	10,000	11,909,856	27,105
Maryland	550	3,501,428	3,974
*Virginia	2,000	1,177,004	1,635
West Virginia	16,000	11,627,757	17,824
*Kentucky	10,000	1,218 072	8,083
Tennessee	5,100	2,180,879	5,542
Georgia	200	354,111	729
Alabama	8,660	4,397,178	10,859
	61,510	76,278,748	
Northern Michigan	6,700	70,022	223
Central:			
Indiana	6,450	3,423,921	8,603
Kentucky	4,000	1,893,120	
Illinois	36,800	17,113,576	38,477
	47,250	22,430,617	

(*a*) Including lignite, brown coal and scattering lots of anthracite.

* Total employed.

*Copyright, 1897, by The Werner Company.

CLASSIFICATION OF THE COAL-FIELDS OF THE UNITED STATES.—*Continued.*

	Area. Sq. Miles.	Production. Short Tons.	No. Employees.
Bituminous (*a*)			
Western:			
Iowa	18,000	3,967,253	9,995
Missouri	26,700	2,245,039	7,523
Nebraska	3,200	----------	---------
Kansas	17,000	3,388,251	7.339
Arkansas	9,100	512,626	1,493
Indian Territory	20,000	969,606	3,101
Texas	4,500	420,848	1,062
	98,500	11,503,623	
Rocky Mountains, etc.:			
North Dakota	---------	42,015	77
Montana	---------	927,395	1,782
Idaho	---------	----------	---------
Wyoming	---------	2,417,463	3,032
Utah	---------	431,550	671
*Colorado	---------	2,776,817	6,507
*New Mexico	---------	580,238	985
Nevada	---------	150	2
		7,175,628	
Pacific Coast:			
Washington	---------	1,106,470	2,662
Oregon	---------	47,521	88
California	---------	67,247	125
	---------	1,221,238	
Total product, including colliery consumption	---------	170,741,526	---------
Total number employed	---------	----------	376,206

(*a*) Including lignite, brown coal and scattering lots of anthracite.
* Total employed.

The coal produced in the country in 1894 exceeded in value the combined values of the following metallic products for the same period: Pig-iron, gold, silver, lead, zinc, quicksilver, aluminium, antimony, nickel and platinum by over $1,000,000, or in other words, the spot value of the coal product, both anthracite and bituminous, was $186,141,564, while the spot value of the combined products, enumerated above, was $185,027,646, or $1,113,918 less than the coal product.

The number of persons employed in and about the coal-mines of the United States in 1894 was 376,206.

Anthracite Mining Methods. As might be expected from their dissimilarity in physical character and structural conditions, mining methods in the anthracite and bituminous coal-fields differ widely.

In the anthracite region, coal is mined from beds whose angles of inclination vary from 0° to 90°, hence the methods of opening and subsequent mining vary materially. The method of developing a colliery is dependent upon certain conditions, and these may be topographical or geological, or both. The several methods are: 1. Drift or adit; 2. Tunnel; 3. Slope; 4. Shaft; 5. Stripping.

A *drift* is an opening in the coal-bed, driven horozontally above water-level in the direction of the strike. This method is used where the outcrop is found in gaps and ravines. Tunnels are sometimes driven from day at right angles to the strike of the measures to cut the coal-beds. These methods are, of course, cheaper than slopes and shafts, since they drain themselves, and no pumping or hoisting engines are required.

A *slope* is an opening upon a bed at right angles to its strike, and in the direction of the dip, or inclination.

A *shaft* is an opening sunk vertically through the measures to the desired bed or beds.

A *stripping* is, as its name implies, an area of a coal-bed from which the soil and loose rock have been stripped and the coal-bed laid bare.

The slopes now being sunk are divided into three compartments. Two of these are used for hoisting-ways, while in the third are laid the water-column pipe and pipes conveying steam or compressed air to the pumps below. The shafts are rectangular in form and have from two to six compartments.

The slope having been sunk to the required depth (generally 100 yards for each lift), gangways or galleries are turned to both the right and left in the bed, and are driven in the direction of the *strike* on a grade of four to six inches to the 100 feet. A gutter or ditch is cut along the low side of the gangway, and through this the water passes to the sump, from which it is pumped to the surface. As the gangways must be kept upon until the final robbing of the lift is completed, it is required that they be timbered securely. Several forms of timbering are in use: 1. Single timber, i.e., where a single prop is set at right angles to the dip on the high or upper side of the gangway; 2. Post and bar, consisting of two pieces, one longer than the other, the shorter resting on the longer, forming an angle, the point of which extends up the pitch; 3. A single prop and collar, one end of the collar being notched into the top rock; 4. Double timber, consisting of two props and a collar of cross-piece. Lagging or pieces of small timber reaching from prop to prop, and collar to collar, serve to support the intervening material. The gangways are driven continuously to the lines or boundary pillars of the tract.

Where a larger supply of coal is required than can be had from one lift, two or more lifts are worked at the same time.

In the anthracite region, where the beds are tilted, tunnels are driven from one bed to the other, and all are worked simultaneously.

The change in angles of inclination sometimes requires the sinking of underground slopes and the driving of counter-gangways to win the coal in the areas so affected.

The several systems of mining now in use in the anthracite region may be summed up briefly as follows:

1. Pillar and breast; 2. Longwall; 3. Panel; 4. Veith boundary; 5. Rock-chute.

In the pillar-and-breast system, which is the one almost exclusively used, the working-places are rectangular chambers, varying in width and length. Generally speaking, these are from 6 to 12 yards in width, dependent upon the character of the top-rock and the character of the coal-bed

itself. The length of these rooms, except where the beds are tilted but slightly, seldom exceed eighty to ninety yards. As all timber, etc., must be carried to the face of the breast from the gangway by hand, the time and labor required to perform this makes the coal won too expensive when the breasts exceed these distances. In this system, pillars of coal are left on both sides of the breasts to support the roof. For the purpose of ventilation, however, small headings are driven through them as required.

The longwall system has not been introduced in the anthracite region, as its adaptability to working highly plicated beds is not admitted; but in the bituminous regions of several of the states this system is used to great advantage.

The system, as its name indicates, contemplates the removal of the coal in longwalls, or faces. There are two methods, known as longwall-advancing and longwall-retreating. In longwall-advancing, the coal is removed as the work progresses, the haulage-ways being supported by the gob, or refuse, being tightly packed.

In longwall-retreating, the haulage-ways are driven first to the limit of the property. Mining is then begun and carried toward the outlet, no attempt being made to support the roof after the coal has been removed. It much resembles the method of robbing in the pillar-and-breast system.

The panel system, invented by Col. D. P. Brown of the Lehigh Valley Coal Company, is a modification of the pillar-and-breast system. Colonel Brown's description of the system is as follows:

"When the mammoth seam is pitching from 15° to 45° and has its usual thickness, in the middle coal-field, of from 30 to 50 feet, the panel system may be commenced by driving the gangway and airway as in ordinary pillar-and-breast workings; but instead of opening breasts by driving up a shute every eight or ten yards along the course of the gangway, a shute is driven up through the seam to the gangway above, at a distance from the slope, shaft or airway sufficient to leave a thick pillar of coal to protect the main opening.

"At a distance of thirty or forty yards from this shute, a shute is opened, and at about thirteen yards from it a second shute is opened. These two shutes are driven up and opened out into two twin breasts, about eight yards wide, separated by a pillar of coal about five yards thick. A second pair of twin breasts is opened fifty or sixty yards from the first pair, and a third pair at an equal distance from the second, and so on. Midway between each pair of breasts a shute similar to the first is driven up to the gangway on the overlying lift.

"These shutes are constructed so that the coal may run freely, and are provided with a traveling-way on one side, giving the miners free access to the workings.

"Small headings, or gangways, are driven in the bottom bench of coal, at right angles to these shutes, and about ten to twenty yards apart, the lowest heading being within six or eight yards of the gangway.

"After the twin breasts are exhausted, the pillar between them is robbed out; but when the roof is poor, only a small portion of this pillar can be obtained.

"To begin mining the coal in the panel (after the breasts are robbed out and abandoned), work is commenced in the upper heading, or gangway, by widening out the end like a breast, and extending the working up to the outcrop or to the next lift above, making the opening wide enough to bring down the top when a skip is taken off the solid. The coal thus falls down on the slope to a point under cover, where the laborer can load it in safety. A small mine-car or buggy is used in the panel-gangways or headings to transport the coal to the shute, down which it is thrown, to be loaded in mine-cars standing in the gangway below.

"When the upper panel-gangway has been worked back a short distance, the next gangway below it is started, and this process is continued until the panel is exhausted, the miner always having a safe retreat into the panel-gangway when a fall of coal or roof is imminent."

The Philadelphia and Reading Coal and Iron Company is now using what is known as the Veith boundary plan with excellent results. It was suggested by John Veith, general mining superintendent of that company. In this plan the coal is worked by the pillar-and-breast system, but the gangway stumps are made much larger than ordinarily, and at the place of every tenth or twelfth breast a block of coal fifty to sixty yards is left solid.

By this method a greater percentage of the pillar of coal can be won, while in case of a squeeze or crush it extends only over the set of breasts between these barriers. The coal thus left remains until the limit or land line has been reached and robbing back begun.

Rock Chute System. By this system, which is applicable on pitching beds not too far distant from each other, all gangways and airways are driven in the underlying or smaller bed, and by means of chutes driven through the intervening rock the coal in the upper or larger bed is mined, the workings being opened out from these chutes on the ordinary pillar-and-breast plan. At some of the collieries, by the use of this system immense bodies of coal which formerly were considered lost, owing to squeezes in the larger bed closing the gangways, etc., have been recovered.

The Slushing Process. One of the most important advances made in the mining of anthracite is the process of slushing.

By slushing is meant the filling in of all worked portions of the mine with the refuse material from the breaker.

Briefly, the process is as follows:

Bore-holes are drilled from the surface to a worked-out breast. Batteries at the bottom of the breasts and at such other places where the material would be likely to escape are erected to

hold the material. The refuse is then, by scraper-lines or other contrivances, run to the mouth of the hole, where it is mixed with water, only sufficient water being used to make the slush flow freely. The slush then is run into the bore-hole, filling up the breasts or cavities. One bore-hole is sufficient for a number of breasts, as the slush flows through the heading between them. Another method is to carry the slush in pipes and deposit it at the desired points. The water passes off through the small cracks and crevices in the batteries, finds its way to the sump, and is pumped to the surface.

The deposited material packs tightly; in fact, so tightly as to require the use of picks if it is desired to remove any of it at any time. With the breasts thus tightly packed, it is possible to remove the coal left in the pillar, the slush serving even better than the pillar to sustain the roof and prevent any serious crush.

The town of Shenandoah, Pennsylvania, from beneath which much coal was removed, was saved from subsidence by this method.

Up to the present time this method has not been used where the pitch of the bed exceeded 35°.

Breasts are of three kinds, known as,—1. Wagon-breasts; 2. Buggy-breasts; and 3. Chute-breasts. The angle of inclination of the bed determines the kind of breast to be used.

Wagon-breasts are those in which the mine-wagon to be loaded is taken directly from the gangway to the face of the breast. These are used where the dip is slight (0°–7°).

Buggy-breasts are used where the dip is too great to take the wagon to the face, and yet not sufficiently great for the coal to run down the chutes by its own weight (7°–12°). In these, small cars, called buggies, are used to carry the coal from the face to the chute leading to the platform at the mouth of the breast, from which it is shoveled into the regular mine-wagon.

Chute-breasts are used where the pitch is sufficiently strong to carry the coal by gravity from the face to the mine-wagon on the gangway (12° to 90°). In chute-breasts, instead of opening up the breast to its full width from the gangway, a chute four to six feet wide is driven to a heading ten yards above the gangway and running parallel to it, and from this point the breast is opened the full width determined upon. The chute thus made is timbered securely. Near the head of the chute a plank battery is erected to prevent the intake air-current escaping through the chute to the return airway. These have a door for ingress and egress, while a space sufficiently large for the coal to pass into the chute is left to one side, and on the bottom of the battery. This opening being generally filled up with coal, but little air escapes.

On either side the breast, props, or "jugglers," are notched into the pillars, forming triangular openings, called manways. On the upper side of these, planks are nailed, thus forming a receptacle into which the slate, etc., is thrown, instead of being taken to the surface. The manways are floored with sheet-iron, and through them the coal is run to the chute below.

Breasts are also driven with two chutes, and in some cases two chutes and a manway, cutting the stump between the breast. Several modifications of these plans are used, as required by circumstances. In steep-pitching breasts the surplus coal, which cannot be loaded out as soon as mined, is retained, and is drawn as required.

Ventilation. The several methods of ventilations are: 1. Furnace; 2. Fans.

While sinking slopes and shafts, the ventilation is accomplished by means of steam-jets, the exhaust from the drills using compressed air, or by a small suction-fan from which a pipe leads to the working-place. This pipe is extended as the work progresses. Since the passage of the Mine Law in Pennsylvania, furnace-ventilation is no longer in use in the anthracite region. Fans, either suction or blowing, have entirely taken the places of the furnaces. Fan-ventilation is rapidly superseding furnaces in the bituminous regions also.

In mines developed by a shaft, a second shaft is generally sunk. (The Mine Law requires two openings.) The second shaft is generally used as an air-shaft.

In slope-workings, an airway is sunk parallel to the slope, a strong pillar of coal being left between them. Parallel with the gangways, headings are driven from eight to fifteen yards up the pitch, which serve as return-airways. Headings are cut through the pillars between the breast every twenty yards, so that the air may pass from one breast to the other without being brought down to the stump or main heading.

When the bed is thick, airways may be driven in the coal over the gangway, or in the coal on the same level as the gangway. The first method is used where the bed is on a steep pitch, and the latter where the dip is very slight. Cross-headings are driven from these to the working-places and the gangways as required.

By means of doors, overcasts, stoppings and brattices, the air is conveyed to the desired points. The Mine Law requires mines to be divided into sections, and that each section shall have its separate current of air. The reason of this is obvious.

Haulage. In this direction but little change is noticed in the anthracite region, except at a comparatively few collieries. In these the mule has given place to electric motors, steam and compressed-air locomotives, and tail-rope and endless-rope haulage.

Steam mine-locomotives are objected to,—1. Because of the noxious fumes thrown off; and 2. In gassy mines, because of the danger of explosions. The second objection, also, is urged against the use of electric motors.

At a few anthracite mines compressed-air locomotives are in use, and seem to give most satisfactory service.

Rope-haulage, however, is being introduced into a number of mines, and the results have been in most instances entirely satisfactory.

At some of the mines electric motors are in use, notably at the collieries of the Hillside Coal and Iron Company, in the northern anthracite field, and at the Bear Run colliery, near Blossburg, Tioga County. At the Helvetia mine, in Clearfield County, Pennsylvania, electricity was used exclusively as the motive power. Hoisting-engines, pumps, mining-machines, and haulage-motors were run by it. The results, however, were disappointing and the electric plant was removed.

A large plant, erected by the Youghiogheny Coal Company at their Scott Haven mines, is said to give the greatest satisfaction. At these operations the fans, pumps, haulage-motors and coal-cutting machines are run entirely by electricity. Large air-compressor plants have been erected at the Nottingham shaft and at the Glen Lyon mines, near Wilkesbarre. Haulage, pumping and rock-drilling are accomplished by this power in a most satisfactory manner.

In the anthracite region no mining-machines are used, the work being done with the pick and drill. The coal is won by blasting. The drills used in making the shot-holes are of endless variety. They are both of the rotary and percussion type.

In the bituminous region, however, where the conditions are more favorable for machine-work, machines of numerous patterns have been introduced, and these perform the laborious work of making the "undercuts" in rooms, headings and entries at a cost far less and with greater celerity than can be done by hand. For these machines compressed air and electricity furnish the power. Heading-machines have been introduced at several of the mines, and the results obtained are said to be excellent.

More improvements have been made in the direction of the mechanical branch than in the actual mining branch. Hoisting-engines, pumps and mechanical contrivances of all kinds used in and about the mines are abreast of the times. In deep shafts the use of water-hoisting tanks is found cheaper than pumping, and this method is now being introduced. Pneumatic culm-conveyors have in a number of instances taken the place of the "dumper" and dirt-plane for the removal of refuse matter from the breaker.

The colliery buildings, formerly frame, are now being constructed of corrugated iron. Wrought-iron casings for ventilating-fans are replacing those made of wood.

The poor condition of the coal trade, from a financial standpoint, during the past few years has no doubt retarded much work in the way of improvements. The cost of producing anthracite must be reduced, and by some means other than in any reduction of wages.

Unlike bituminous coal, which receives little or no preparation for market, other than screening, anthracite must undergo a thorough course of preparation, and for this purpose it is run through a "breaker." All slate and other impurities must be removed from it, and it must be separated into the several sizes. Hence as much care and skill are required to prepare it as to mine it.

During the past 15 years certain sizes which formerly were considered unmarketable have come into demand, to the detriment of some of the larger.

The demand for the size known as lump has steadily been decreasing since 1880. To illustrate this decline, it may be said that at the collieries on the lands of the Girard estate, which may be taken as an example of the rest, the shipment of lump size in 1880 was over fifteen per cent of the whole, while that of buckwheat size was less than one per cent. In 1895 these same collieries shipped of the buckwheat size nearly seventeen per cent, while the shipment of lump was less than four per cent. This change can be ascribed to two principal causes: 1. Furnaces, iron-mills and steam-vessels have largely abandoned the use of anthracite for bituminous coal; 2. The invention of automatic stokers and forced draft by means of steam-jets, etc., which are used in industrial establishments, and the increased use of base-burning stoves for domestic purposes.

The demand for the smaller sizes, viz., buckwheat and rice coal, necessitated numerous changes in former modes of preparation. The slate and other impurities, which formerly were removed by hand, now are removed by mechanical appliances, known as coal-jigs and slate-separators. Both these contrivances work on the principle of the difference of specific gravity between the coal and slate. Both perform the work required better than can be done by hand, and at much less expense. The slate-picker boy is disappearing from many of the collieries.

Perforated plates are rapidly taking the place of the wire segments in the screens. The coal is now fed to the screens by elevator-buckets, and by their use a regular and steady flow is obtained, and overcrowding, so prevalent at one time, is avoided now, and more regularity in sizing is obtained.

Much of the coal going to market is washed either in the jigs or in passing over the lip-screen while being loaded into railroad cars.

In stripping the soil and loose rock from the beds, steam-shovels are employed, while in a number of operations immense cableways have been erected to transport this material to its place of deposition. By this method of stripping, much coal has been won which would otherwise have been lost through inability to support its cover while being mined under the regular method.

Bituminous Mining Methods. Mr. Selwyn Taylor, in writing on *General Mining Methods of the Pittsburg Coal Region*, says:

In opening mines in this district, complete surveys are usually made of the tract of coal to be mined, locating all outcropping, and showing the difference of level between all points at which the coal is to be found. With this data it is determined, then, in what place to open the mine, and in what direction to drive the main gang-

ways, or entries. If possible, the mouth of the drift is located so that the main entries will be driven on the rise of the coal, thus making the mines self-draining; this, however, is not always, or even often, possible, as the coal very frequently dips directly away from the railroad or river, as near which as possible the mine must be opened.

The working of the coal to the dip is not usually a matter of very great disadvantage, as the dip is so slight that it does not materially increase the hauling expenses, and so many openings for drainage may easily be had to the outcrop.

If possible, all entries are driven on the "butt" (N. 65° W., or S. 65° E.) or "face" (N. 25° E., or S. 25° W.) cleavage. The main entries, generally, are driven as near the "face" cleavage as possible, while the entries from which the rooms, or working-places, are turned always are driven on the "butt" cleavage.

Almost all the mines in this district are opened by drifts; the main entries usually are driven double, and sometimes treble,—that is, two or three entries are driven parallel with each other; a wall of coal 25 to 45 feet wide, called entry pillar, is left between these parallel entries; also, on either side of these entries, pillars of from 18 to 30 feet in thickness are left for protection of traveling-ways.

The main entries usually are driven from 8 to 9 feet in width, except at the front,—that is, the end of the engine-plane,—where the entry used is made from 12 to 15 wide, in order that two tracks may be laid in it.

"Break-throughs" are made every thirty yards between these parallel entries. At the mouth of the drift the entries are well-timbered, as the shallow nature of the hill at the outcrop would cause them to continually fall in.

In driving the entries, a wooden rail is laid first. This is replaced, from time to time, by permanent road-rail. Iron lasts well in the mines, as the roads are generally kept dry, and the rolling stock used is light. Ties are placed about every two feet and are made of 3-by-4-inch timber.

Entries. There are two systems of entries in use in the Pittsburg district mines. The first, which is the older system, is that of driving the butt-entries 160 yards apart, the usual distance, and face entries, or air-courses between the butt entries, the same distance apart from each other, thus laying off the whole mine into blocks 165 yards square. This is styled the single-entry system.

All the mines now being opened are developed on the double-entry system. Under this plan no air-courses are driven, two butt-entries instead of one being driven parallel with each other, thirty to forty feet apart, leaving a solid pillar of coal between them, and turning-rooms off on but one side of the entry. The same amount of entry-driving is required under both of these methods, while 25 per cent less entry-stumps are required under the double-entry system. Much better ventilation is acquired under the double-entry system, as the air can be kept constantly circulating to the heads of the entries by means of "break-throughs" between the two entries. Under the double-entry system it is possible to take out all the entry-stumps or pillars, while from 25 to 50 per cent of the entry-stumps are lost under the single-entry system.

The rooms, or working-places, are turned off the butt-entries about thirty feet apart; they are worked in, for the first 15 to 21 feet, only seven feet wide; then they are widened on one side to a width of 21 feet, leaving a coal-pillar, called a "rib," 12 feet thick. The track is laid straight up the side of the room, from the opening off the entry. All of the room as it is worked up, except the portion on which the track is laid (about seven feet wide), is filled with the refuse of the coal and the slate, called "gob," posts being first set in rows six feet apart, three in a row, to support the roof. If the roof is bad, posts are of from 4 to 8 inches in diameter, 5 to 5½ feet in length. "Break-throughs" are made in the ribs, about every thirty yards, into the next room.

The track laid up the side of the room is made of wooden rails 2 by 4 inches. The road in the mouth of the room, however, and the turn-off on the track in the entry, are made of T-iron. The miner working in a room works much the same as in an entry, save that where the coal is blasted the cut at the side of the room is not made.

BAIRD HALBERSTADT.

COAL-OIL. See PETROLEUM, Vol. XVIII, pp. 712 et seq.

COAL-TAR. See TAR, Vol. XXIII, pp. 57–59.

COAL TRAFFIC POOLS. See RAILROADS, in these Supplements.

COALVILLE, a town and the capital of Summit County, northeastern Utah; situated on the Weber River, at the base of the Wahsatch Mountains, on the Union Pacific railroad, about 35 miles E. of Salt Lake City. Its inhabitants are engaged chiefly in the mining of coal for railroad and manufacturing purposes. Population 1894, 1,515.

COAMINGS, in a ship, small frameworks on the deck, to prevent sea and rain water from running down the hatchways, ladderways and scuttles.

COAN, TITUS, an American missionary to Hawaii; born in Killingworth, Connecticut, Feb. 1, 1801; died in Hilo, Hawaii, Dec. 1, 1882. He studied theology at Auburn, New York, and immediately after his graduation sailed from New York for the Straits of Magellan, Aug. 16, 1833. He returned to New London, Connecticut, in the following year, and, seven months later, sailed, with seven others, for the Hawaiian Islands, arriving at Hilo in the summer of 1835. Mr. Coan spent two years in the study of the language, in which he became a ready speaker, and the number of conversions under him from 1838 to 1840 was reported as more than seven thousand. He received, in all, up to 1882, over thirteen thousand into the Hilo and Puna churches. In 1870 he visited the United States, but after an 11 months' stay returned to Hilo to renew his labors as a missionary. He published several works

about his travels, notably his *Adventures in Patagonia* and *Life in Hawaii*.

COAN, TITUS MUNSON, son of the preceding, an American, physician and journalist; born in Hilo, Hawaii, Sept. 27, 1836; graduated at Williams College, Massachusetts, in 1859. He took up the study of medicine, and was a surgeon in the United States navy during the Civil War. From 1865 he was engaged in active practice and in literary pursuits in New York City. He gave much of his time to study, and published several valuable works; among them, *Topics of the Time* and *Ounces of Prevention* (1883). He was the editor of the *Pronouncing Gazetteer* of *Webster's International Dictionary*.

*COAST DEFENSES OF THE UNITED STATES. The coast of the United States may, for convenience, be divided into four regions: 1. The Lake coast, having 37 cities, with an aggregate population of 2,525,893 and an aggregate wealth of $2,624,408,022; 2. The Atlantic coast, with 75 cities, population 6,640,532, and wealth $6,899,512,748; 3. The Gulf coast, with 8 cities, population 354,182, wealth $367,995,098; 4. The Pacific coast, 11 cities, population 527,223, wealth $547,784,698—a total of 131 cities, with a population of over 10,000,000 and aggregate wealth exceeding in value $10,000,000,000.

The principal seaport cities have had for many years no adequate means of defense. In 1886 the Board of Fortifications reported 2,020 sea-coast guns on hand, available for use, exclusive of sea-coast mortars, all of which were essential for the protection of torpedo-lines and the defense of the major and minor ports. The number of men necessary to arm them in time of war was estimated at 52,236, or about 2,500 in time of peace. But many of these guns were obsolete and of little value, and many of the batteries could not stop a single first-class ship-of-war, much less a fleet equipped with the modern appliances of war.

The facts that the entire system of warfare had changed within a generation; that European countries had increased their navies in recent years; that the ports of the United States were no longer able to resist the invasion of a foreign foe; and that in case of attack great loss of life and property would result, to say nothing of possible occupancy by the enemy, the consequent destruction of commercial interests and the payment of an indemnity—all these aroused the nation to a sense of its insecurity and to the necessity of multiplying and strengthening its coast defenses.

Accordingly, in 1885, induced by urgent representations on the condition of the coast defenses by civilians and military and naval officers, Congress directed President Cleveland to appoint a board to investigate and report measures to place the seaboard in a state of defense. This board—known as the Endicott or Fortifications Board—reported in 1886. The report covered thoroughly the ground of inquiry, and its recommendations named the ports requiring fortifications, the nature of the needed works, the number and character of the guns and mortars required, and the probable cost of all. The estimates submitted covered 27 principal ports, and called for permanent works, to be armed with 677 high-powered guns and 824 modern mortars. The amount of money absolutely demanded was placed at $97,782,800, exclusive of $28,595,000 for floating batteries; $21,500,000 was to be made available in 1886, and thereafter the annual appropriations should be $9,000,000. This report still stands as the projected system of the coast defenses of the United States.

The original plan contemplated the completion of the work in 1896. But the actual appropriations for armaments and emplacements since the report of the board up to 1896 were but $10,631,000. The average annual appropriation for guns and emplacements has been less than $1,500,000, instead of $9,000,000, as called for in the report. The work has thus been conducted at about one seventh the rate proposed. "If future appropriations for the manufacture of guns, mortars and carriages be no larger than the average authorized for the purpose since 1888, it will require 22 years more to supply the armament of the 18 important ports for which the projects complete are approved. If the appropriations for the engineer work are to continue at the rate of the annual appropriations since 1890, it will require seventy years to complete the emplacements and platforms for armament for the ports referred to."—*Report of Secretary of War*.

The Endicott board reported as needed, in addition to the 2,020 guns then on hand, 1,305 guns of modern construction. But the last report of the Secretary of War shows that partial provision has been made for 42 gun-emplacements out of 448 needed, and 64 mortar-emplacements out of 952 required. The report expects that in July, 1896, there will be 1371 8 and 12 inch guns and 55 gun-carriages and 24 emplacements ready for use, and that 24 guns out of 448 required will be in position and available for defense.

Since the organization of the Endicott board the United States has appropriated over one hundred and ten million dollars for the building of its navy and a little more than ten million dollars for its coast defense. The recent port-defense vessels are: The *Amphitrite*, 3,990 tons, with 4 10-inch, 2 4-inch and 2 6-pounder quick-firing guns; the *Miantonomoh*, 3,990 tons, and the *Terror*, 3,900 tons, each with 4 10-inch and 2 6-pounder quick-firing guns; the *Puritan*, 6,160 tons, with 4 12-inch, 6 4-inch and 2 6-pounder quick-firing guns; the ram *Katahdin*, 2,183 tons, with 4 6-pounder quick-firing guns. To which may be added the *Monadnock*, 3,900 tons, with 4 10-inch, 2 4-inch and 2 6-pounder quick-firing guns; and the *Monterey*, 4,048 tons, with 2 12-inch, 2 10-inch and 6 6-pounder quick-firing guns. In 1896 there were a total of 19 ships for coast defense.

The settled policy of the United States is evidently to make its ports and harbors impregnable and its naval power most effective. The boundless capital in property that would be destroyed by bombardment, with its attendant loss of life, the material interests of the whole nation, and the patriotism of its people, urge the completion of the work as early as practicable.

NELSON A. MILES.

COAST-GUARD, originally, in Great Britain, an organization intended to prevent smuggling merely,

*Copyright, 1897, by The Werner Company.

but now constituted so as to serve as a defensive revenue and life-saving force. This guard is a naval reserve force which by law cannot exceed ten thousand men. It is under the control of the admiralty. For purposes of organization and training, the coasts of Great Britain are divided into nine districts, each district under the command of a regular navy captain. Commanders and lieutenants are stationed in all important coast towns and at a port in each district a man-of-war is stationed, which is used as a training-ship for the seamen of the coast-guard. The coast-guardsmen are required to do practice duty on board ship for one month of each year, but during the rest of the time are only to be called to sea if necessary. In the United States the term *coast-guard* is applied to the men of the life-saving stations of the seaboard.

COAST RANGE, a range of mountains of California, nearly parallel to the Pacific Coast, and extending from the northern end of the state to the southern. It forms the southern boundary of the great central California valley, and consists of several ridges, which, with the intervening valleys, form a tract some forty miles in width. The valleys are often long and wide and of remarkable salubrity and fertility. Among the highest peaks of this chain are San Bernardino, at its southern end, 11,060 feet above the sea, and Ripley, 7,000. The Sierra Nevada joins the Coast Range at its northern and southern extremities.

COAST SURVEY OF THE UNITED STATES. In 1807, upon the recommendation of President Jefferson, Congress passed an act authorizing the President to cause a survey of the coast of the United States to be made, in order to prepare accurate charts of every part of the coast; but it was not till 1817 that the work was actually begun. In that year a commencement was made near the harbor of New York, under the direction of Prof. F. R. Hassler, a native of Switzerland, who had gained experience in similar works abroad. Owing to the failure of Congress to make suitable appropriations, the work was prosecuted only at intervals between 1817 and 1832, no general survey being attempted, and the detached surveys being limited to the most elementary information.

In 1832 Congress empowered Professor Hassler to employ such astronomers as he thought advisable to assist the military and naval officers in the prosecution of the work, and provided an appropriation adequate to the requirements of the service. From that date to the present time the survey of the coast has been in steady and active progress. Professor Hassler continued in charge of the work until his death in 1843. His successor was Prof. A. D. Bache, who superintended operations until his death in 1867, when Professor Benjamin Peirce, the eminent astronomer, was appointed his successor. Professor Peirce resigned in 1874, and was succeeded by Carlile P. Patterson, formerly hydrographic inspector upon the survey. C. P. Patterson died in 1881 and was succeeded by Prof. J. E. Hilgard. Professor Hilgard resigned in 1885, and was succeeded by Frank M. Thorn, who, in 1889, was succeeded by Dr. Thomas C. Mendenhall. The latter remained in charge of the department until 1895, when he was succeeded by William W. Duffield of Michigan. The superintendent receives a salary of $6,000 per annum.

Some estimate of the magnitude of the work may be formed from the fact that the American coast-line, exclusive of Alaska, reaches a total of 7,060 miles, while the shore-line, following the indentations of the numerous bays, etc., reaches a total of 29,375 miles. The work combines three important operations: 1. The geodetic survey, which accurately determines the geographical position of various points along the coast by astronomical and trigonometrical methods; 2. A topographical survey, which delineates the coast-line and the characteristic features of the land; and 3. A hydrographic or nautical survey of the channels, shoals and approaches to the shore, including observations of currents and tides.

As fast as the work is completed, charts are published in sheets for the use of mariners, and can be obtained at a low price at the principal seaports The plan of publication embraces a main series of charts, giving a continuous representation of the entire coast on a scale of 1:80,000, or about three quarters of an inch to a mile, and exhibiting all natural and artificial features of the shore, together with the depth of water and configuration of the sea-bottom, channels, shoals, etc.; a series of charts on a smaller scale of 1:400,000, known as "off-shore charts," for the use of mariners in approaching the coast; and a series of still more general charts on the scale of 1:1,200,000 for the use of mariners in navigating between distant points. In addition to these, a large number of charts of separate harbors, bays, anchorages, rivers, passages and dangers, on scales varying from 1:5,000 to 1:60,000 are published.

Although the survey of the coast proper is now nearly completed, there still remains plenty of work to occupy the force. In 1871 Congress provided for conducting a chain of triangulation across the continent to form a geodetic connection between the Atlantic and Pacific coasts, and for the execution of the trigonometrical survey of such states as should make a requisite provision for the topographical and geological survey of their domain. This work is now being actively prosecuted, and the plan of a general geodetic survey of the entire country bids fair to be realized.

COATESVILLE, a railroad junction of Chester County, Pennsylvania, on Brandywine Creek, 40 miles W. of Philadelphia. It has water and gas works, extensive boiler-works, and rolling, paper and woolen mills. Situated in the rich and fertile Chester valley, it enjoys a large and growing trade. Population, about 4,000.

COATI OR COATI-MONDI, a genus of carnivorous quadrupeds of the family *Procyonidæ*, subfamily *Nasuà*. They are nearly allied to the raccoons, and, like them, are exclusively American. They have an elongated snout, which is a sort of flexible proboscis, and is turned about in search of food, and employed in rooting up the earth to obtain worms and insects. See MAMMALIA, Vol. XV, p. 441.

COAT OF ARMS, in the middle ages, a coat worn by princes and great barons over their armor, and descending to the knee. It was made of cloth of gold or silver, of fur or of velvet, and bore armorial insignia. The coat of arms in heraldry is a relic of the ancient armorial insignia, divested of the coat on which it used to be embroidered. See HERALDRY, Vol. XI, p. 683.

COAT OF MAIL, in the armor of the middle ages, a suit made of metal scales or rings, linked one within another. See ARMS AND ARMOR, Vol. II, p. 556.

COATZACOALCOS, a river of the Isthmus of Tehuantepec, in Mexico. It rises in the Sierra Madre, and falls into the Gulf of Mexico 130 miles S.E. of Vera Cruz. It is navigable for large vessels for 30 miles, and is interesting as part of a route which has been surveyed for an interoceanic canal. Its harbor is being fitted for large vessels.

COBB, CYRUS, son of the well-known New England clergyman, Sylvanus Cobb, was born in Malden, Massachusetts, Aug. 6, 1834; graduated from the Lyman School, East Boston, in 1848, and afterward made special studies of the classics. He and his twin brother, Darius, studied art together, and refused a chance to pursue the study in Europe, wishing to preserve the American feeling, even at the expense of a lack of the technique found only in the French and other European schools. He began the study of law in 1869 as a means of discipline; graduated from the Boston University Law School in 1873 and practiced for six years, resuming his art-work in 1879. Among his sculptures are a bust of the late Benjamin Penhallow Shillaber (Mrs. Partington) (1867); the Cambridge Soldiers' Monument (1869); heroic bas-relief of Prospero and Miranda (1883); heroic statue of Abbott Lawrence (1886), *Ancient Celtic Bard Contemplating the Future Woes and Dawning Light of Ireland* (1886); and a bust of Theodore Parker (1886). Among his paintings are *Jesus Condemned* (1879); *Warren at the Old South* (1880), and portraits of Drs. A. P. Peabody and J. Appleton. Mr. Cobb studied music as well as art and law, was a member of the famous Boylston Club and was an accomplished tenor singer. He wrote 30 sonnets on the *Masters of Art*, which were printed in the Boston *Transcript*. Cyrus, as well as his twin brother, Darius, served in the war of the Rebellion in the Forty-fourth Massachusetts Regiment; and the former, in 1870, wrote *The Veteran of the Grand Army*, to show the aims of the Grand Army of the Republic.

COBB, DARIUS, twin brother of Cyrus; studied with his brother at the same schools and graduated at the same time. Not only did the brothers resemble each other so closely in feature and action that it was difficult for one not intimate with them to distinguish one from the other, but they married two sisters. Darius began the study of art when his brother did, and they pursued their work side by side, generally in the same studio. Among the latter's paintings are *Judas in the Potter's Field* and *King Lear* (1877); *Christ Before Pilate* (1878), which last has been engraved; and *Washington on Dorchester Heights* (1880). In conjunction with Cyrus, he painted a rendering of Leonardo da Vinci's *Last Supper*, which attracted much attention in Boston at the time. The portraits painted by Darius included one of Rufus Choate (1877), purchased by the Suffolk bar; of Governor Andrew (1868) and Professor Agassiz (1883), both purchased by Harvard University; and one of Charles Sumner and Henry Wilson, the latter bought in 1876 by the authorities of the native town of the distinguished Massachusetts Senator. Darius Cobb assisted his brother Cyrus in his musical work, lectured on art before New England lyceums, and for several years was art editor of the Boston *Traveler*. He wrote much, both in prose and verse, for various periodicals.

COBB, HENRY IVES, an American architect; born in Brookline, Massachusetts, Aug. 19, 1859; descended on both sides from old New England colonial settlers; received his education in private schools, the Brookline High School, the Boston Institute of Technology and the Lawrence Scientific School of Harvard University. After spending some months with the architectural firm of Peabody and Stearns in Boston, he entered competitive drawings for the Union League Club House in Chicago, won the appointment, and at the request of the directors removed to Chicago to superintend its building, and thus became established there as an architect in 1882. Mr. Cobb has built many private residences, both city and suburban; those of Potter Palmer, R. R. Cable and Dr. McGill in Chicago being conspicuous among the former, and the Studebaker mansion at South Bend, Indiana, and the Country Club House at Lake Forest, Illinois, among the latter. The greater part of his time, however, has been devoted to public buildings, the Newberry Library, Yerkes Observatory, Chicago Historical Society, the Owings and Venetian office buildings, Kinzie Apartment House, the Chicago Athletic Association Building, Durand Art Institute at Northwestern University, Lake Forest, and several churches being among the number.

His most important work has been the building and construction of the Chicago University, upon a plan more extensive and complete than any similar group in the world. It consists of 46 buildings, composing four large quadrangles and covering four large city squares, and includes not only ranges of dormitories, but a gymnasium, library, chemical laboratory, observatories, chapel, administrative and recitation buildings, and all the other accessories of a liberally equipped university.

At the time of the Columbian Exposition Mr. Cobb designed the Fisheries Building, with its myriad unique details, the East India and Indiana buildings, and Cairo Street. The *Revue des Deux Mondes* pronounced the Fisheries Building as being "the most artistic, architecturally perfect, original design of the century."

He was selected by the United States government as architect of the new Federal building in Chicago.

COBB, HOWELL, an American public man; born in Cherry Hill, Georgia, Sept. 7, 1815; died in New York City, Oct. 9, 1868. He was admitted to the

bar of Georgia in 1836, and the same year was an elector on the Van Buren ticket. In 1837 he was appointed solicitor-general of the western circuit of Georgia, and from 1843 to 1851 served by successive re-elections as a Democrat in Congress, becoming Speaker in 1849. He was elected governor of Georgia in 1851, and two years later resumed his law practice. In 1855 he was elected to Congress again, and in 1857 became President Buchanan's Secretary of the Treasury, and as such took advantage of his position to impair the credit of the government. The following year he resigned his office, and became one of the most active advocates of secession. In 1861 he was president of the Confederate Congress and assisted in drafting the Confederate constitution. At the beginning of the Civil War he was appointed brigadier-general in the Confederate army, and subsequently promoted to a major-generalship. He took little part, however, in military movements.

COBB, SYLVANUS, an American Universalist clergyman; born in July, 1799, in Norway, Maine; died Oct. 31, 1866, in East Boston, Massachusetts. From 1828 until 1838 he was engaged in active pastoral work in Waltham and Malden, Massachusetts. From 1838 until 1858 he was the editor of the *Christian Freeman*. He took a prominent part in the temperance and antislavery movements. *A Compend of Divinity; Discussions;* and *The New Testament with Explanatory Notes* (1864), are among his published writings.

COBB, SYLVANUS, an American author, son of the preceding; born in 1823, in Waterville, Maine; died July 20, 1887, in Hyde Park, Massachusetts. He was an active writer and editor. He published *The Rechabite* and *New England Washingtonian. The King's Talisman*; *Ben-Hamed*; and *The Patriot Cruiser*, are the best known of a number of tales written by him. *The Autobiography of Rev. Sylvanus Cobb*, with a memoir, was issued in Boston in 1867. His stories in the *New York Ledger* first attracted attention to that paper.

COBBE, FRANCES POWER, an English writer and leader in reform movements, daughter of Charles Cobbe, a lieutenant in the Nineteenth Light Dragoons, who fought at Assaye, was born at Newbridge House, County Dublin, Ireland, Dec. 4, 1822; and was educated at Brighton. Miss Cobbe was attracted by the radical Unitarian and rationalistic views of Theodore Parker during the brilliant career of that clergyman in the closing years of his life and labor, and adopted his views in a great measure, so much so that all her writings will be found to be tinged with that minister's views of matters pertaining to the mental and spiritual part of man. A general trend of thought, which took its rise from the writings and public utterances of Theodore Parker, may be discovered running through nearly all her publications, which include the following: *An Essay on Intuitive Morals* (1855); *Religious Duty* (1857); *Pursuits of Women* (1863); *Cities of the Past* (1863); *Broken Lights* (1864); *Italics* (1864); *Studies, Ethical and Social* (1865); *Hours of Work and Play* (1867); *Drawing Lights* (1868); *Alone, to the Alone* (1871); *Darwinism in Morals* (1872); *Hopes of the Human Race* (1874–80); *Re-Echoes* (1876); *False Beasts and True* (1875); *Duties of Women* (1880); *The Peak in Darien* (1881); *A Faithless World* (1885); *The Scientific Spirit of the Age* (1888); *The Modern Rack* (1889); *The Friend of Man* (1890).

FRANCES POWER COBBE.

In addition to these, Miss Cobbe wrote and issued a great number of less pretentious works in the form of pamphlets, in the interest of various reforms to which she was devoting herself, among which may be mentioned *The Workhouse as a Hospital* (1861); *Friendless Girls, and How to Help Them* (1861), which was an account of the original Preventive Mission at Bristol; *Female Education* (1862), a plea for the granting of university degrees to women; and a large number of pamphlets and leaflets opposed to vivisection, against which practice she was opposed strongly and uttered some of her strongest protests.

To further her work in the line of reform, Miss Cobbe originated a scheme of labor in ragged schools, and afterward a system for befriending young servants, the latter since being worked by the Metropolitan Association, founded for that purpose. She also did much work for the relief of destitute incurables.

Miss Cobbe traveled extensively in Egypt, Palestine, Greece and Italy, and afterward settled down to hard work in London again, and did editorial writing on *The Echo* and later on *The Standard*, and afterward contributed largely to *The Quarterly Review*, *Fraser's Magazine*, and a number of newspapers and other periodicals. During this time she was engaged in promoting the Aggravated Assaults Act of 1878 whereby wives whose husbands have been convicted of violent assaults upon them are enabled to obtain separation orders.

In 1880–81 she delivered a course of lectures on *The Duties of Women*, which were published and circulated largely in America as well as Great Britain, and, in addition, have been translated into Danish, French and Italian. In the latter year she founded the Victoria Street Society for the Protection of Animals from Vivisection, of which she was the secretary for 15 years, and the late Lord Shaftesbury was the president.

COBBOLD, THOMAS SPENCER, an English authority on parasitic worms; born at Ipswich, England, in 1828; died March 20, 1886. He studied medicine at Edinburgh and lectured in London on botany, zoölogy, comparative anatomy, geology and helminthology, in connection with various hospitals and colleges. He wrote *Entozoa* (1864); *Tapeworms* (1866); and *Parasites* (1879); besides numerous other works on kindred subjects.

COBET, CARL GABRIEL, a Dutch philologist; born in 1813, in Paris; died at Leyden, Oct. 26, 1889. In 1847 he became professor of Greek at the University of Leyden and in 1876 was made foreign

associate of the French Academy of Inscriptions and Belles-Lettres. Among his principal works are *Oratio de Arte Interpretandi*, editions of the Greek classics, and writings on the comic poet Plato, and on Dionysius of Halicarnassus and Xenophon.

COBLESKILL, a village of Schoharie County, central-eastern New York, on the Delaware and Hudson railroad and on Cobleskill Creek, 45 miles W. of Albany. It contains a variety of manufactories. In the near vicinity are extensive quarries of building-stone, and three miles to the east are mineral springs. Population 1890, 1,822.

COB–NUT, a name given to some of the largest and finest cultivated varieties of the hazel-nut. In the West Indies the name is given to the fruit of *Omphalea triandra*, a tree of the family *Euphorbiaceæ*. The tree has a white juice, which turns black in drying, and in Guiana is used instead of ink.

COBOURG, a port of entry and capital of Northumberland County, central Ontario, on Lake Ontario, 69 miles N.E. of Toronto. It contains a Wesleyan university and several woolen-mills, foundries and breweries. It has a good harbor, and steamers ply from here to all prominent lake and river points. Population 1891, 4,829.

COBURG PENINSULA, the most northerly part of Australia, to the west of the Gulf of Carpentaria. It runs out in a northwestern direction toward Melville Island, from which it is divided by Dundas Strait.

COCAINE, a vegetable alkaloid ($C^{17}H^{21}NO^4$) obtained from the leaves of the coca (or cuca, for which see CUCA, Vol. VI, pp. 684, 685), a small shrub growing in the mountains of Peru and Bolivia, but cultivated, after its wonderful properties became known, in other parts of South America. The principal source of the drug as a commercial product, at the present day, is the province of Yuncas, in Bolivia. The leaves from which the drug is obtained are green, about two inches long, the blossoms white and the berries red. The annual product is estimated at forty million pounds. The leaves, when macerated and treated with pure wine, produce one of the finest stimulants ever tried by persons exhausted by excessive mental work or emotional excitement. Many attempts have been made in times past, by chemists, to extract the medicinal and chemical properties of the plant, but no success was reached until within late years, when an alkaloid was isolated which proved a thorough local anæsthetic, and to which was given the name *cocaine*. The drug of commerce forms colorless transparent prisms, is odorless and has a bitter taste. It is only sparingly soluble in water, but freely soluble in ether, and is used as a local anæsthetic. As such it has proved especially valuable in operations on the more delicate organs of the body, as the eye, etc. Two percentage of cocaine added to ordinary cacao butter-pencils converts the latter into a remedy which gives almost instant relief to a chafed or irritated skin, to insect-bites, etc. In 1889 cocaine was made artificially from benzoil-ecgonin by introducing into it the methyl group. Whether the new production possesses special therapeutic properties has not been ascertained, at least not announced.

The history of cocaine is a short one, but its strength as a drug and a poison places it in the front rank of drugs as the most deadly. So benign is its influence that few who begin its use suspect its power until the "cocaine habit" is formed and the victim is rapidly becoming a wreck. Its distinctive feature is due to hyperæmia of the nerve-centers; but as the effect is transient, reaction sets in with ever-increasing power, until the habit is fully formed, and the victim is in the clutches of a terrible adversary, with very little chance of hope for safety. As a stimulant it is regarded justly as far more powerful, rapid and baneful in its effects than any other known drug.

Beginning with 1885, when crude cocaine was first made in Peru, vast quantities were sent to the United States and to Europe. The advantages of exporting the crude alkaloid rather than the leaves proved many and important. The principal source of supply for the United States is by the way of Hamburg.

COCANADA, a seaport and headquarters of Godavari district, Madras, southern India, 315 miles N. of Madras. It exports cotton, oil-seeds, sugar, rice and cigars. Population, 28,856.

COCCEJI, HEINRICH FREIHERR VON, German jurist; born at Bremen in 1644; died in 1719. He studied jurisprudence and philosophy in Leyden, and in 1672 was made professor of the law of nations at Heidelberg, and the following year was appointed to a similar office at Frankfort-on-the-Oder. His work on German civil law, *Juris Publici Prudentia* (1695), was almost universally used as an academical text-book for this branch of jurisprudence.

COCCEJI, SAMUEL, VON, German jurist, and chancellor of Prussia under Frederick the Great; a son of the preceding; born at Heidelberg in 1679; died in 1755. His code of laws, *Codex Fridericianus*, was prepared by direction of Frederick and adopted for the kingdom. He died while chancellor.

COCCO, COCCOA ROOT OR EDDOES, the corms (underground stems) of plants of the genera *Colocasia* and *Caladium*, of the family *Araceæ*, natives of the West Indies and tropical America. The corm forms the principal food of many of the inhabitants, its taste being very much like that of potatoes.

COCCOMILIA OR COCUMIGLIA (*Prunus coccomilia*), a species of plum, a native of Calabria, of which the bark—particularly of the root—is used in that country for the cure of intermittent fevers.

COCCOSTEUS, a genus of fossil fishes, peculiar to the Devonian measures, of the suborder *Placodermi*, order *Ganoidei*. About seven species have been described. See ICHTHYOLOGY, Vol. XII, p. 686.

COCCULUS INDICUS, the very poisonous fruit of *Anamirta cocculus*, of the tropical family *Menispermaceæ*, a family of climbing plants, rich in bitter and poisonous properties. *A. cocculus* is a native of the East Indies; the poisonous principle of the fruits (also called "grains of paradise") is called *picrotoxin*. It is used largely in medicine, in certain ointments, and sometimes in malt liquors, to

which it gives bitter and intoxicating but very dangerous properties. See ADULTERATION, Vol. I, p. 172.

COCCUS, a genus of insects of the order *Hemiptera*, suborder *Homoptera*, the type of a family, *Coccidæ*, allied to the *Aphis*. They are very numerous, and are attached to particular plants, on the juices of which they feed, often producing much mischief by the flow and loss of sap which their punctures occasion. This family contains some species which are of great value, particularly for the beautiful dyes which they yield. Among them are COCHINEAL (Vol. VI, p. 97) and KERMES (Vol. XIV, p. 49).

COCCYX. See ANATOMY, Vol. I, p. 821.

COCHABAMBA, a central department of Bolivia, containing extensive plateaus. The climate is equable and healthful, and its fertile valleys render it the richest and most picturesque district of the republic. It was formerly known as the granary of Peru. Agriculture and cattle-raising are the chief occupations. Area, 26,685 square miles; population, about 355,000. The capital, Cochabamba, has a population variously estimated, as no official census has been taken since 1854, from 15,000 to 40,000.

COCHIN-CHINA, the most southern province of French Indo-China, bordered northeast by the territory of Moïs, northwest by Cambodia, south and east by the Chinese Sea, and by the Gulf of Siam in the west. (See COCHIN-CHINA, Vol. VI, pp. 92–97.) The area is 23,082 square miles, and the population is estimated at (1891) 2,034,453, of whom 3,000 are Europeans, 1,500,000 Annamites, 105,000 Cambodians, 50,000 Chinese, and the remainder Malays and Malabrians. French Cochin-China was incorporated with French Indo-China in 1887, and the whole divided into 21 arrondissements and 4 provinces; viz., Saïgon, Vinh-Long, Mytho and Bassac. There are 5,660 French troops in Cochin-China, besides about 2,800 Annamite soldiers. The imports (1892) amounted to 35,546,628 francs, and the exports to 80,706,856 francs, of which 70 per cent was rice. The annual revenue and expenditure are balanced at about 30,000,000 francs. Railroads and telegraph lines have been introduced, especially in the province of Saigon. There were, in 1892, 51 miles of railroad and 1,840 miles of telegraph line.

COCHITUATE LAKE, of Natick township, Middlesex County, Massachusetts, a sheet of water covering 69 acres, is the chief source of the water-supply of Boston. It is about 18 miles W. of Boston. An artificial channel connects the lake with Sudbury River.

COCHRANE, ALEXANDER DUNDAS ROSS WISHART BAILLIE, a British author; born in November, 1816; died in London, Feb. 15, 1890. He was a member of Parliament in 1841–46, in 1847–52, in 1859–68, and in 1870–80. He succeeded to the peerage as first Baron Lamington in 1880. He was long known to society as Baillie-Cochrane, a writer of poetry, and author of *Young Italy*. He recently published in *Blackwood's Magazine*, *In the Days of the Dandies*.

COCHRANE, ALEXANDER THOMAS, ADMIRAL, LORD, AND THOMAS, distinguished naval officers. See DUNDONALD, Vol. VII, pp. 539 et seq.

COCKBURN, SIR ALEXANDER JAMES EDMUND, an English jurist; born Dec. 24, 1802; died in London, Nov. 20, 1880. He was graduated at Trinity Hall, Cambridge, in 1829; was called to the bar and became queen's counsel in 1831. He first attracted public attention by his brilliant pleadings before Parliamentary committees. He was elected to Parliament as a Liberal from Southampton in 1847; was appointed solicitor-general in 1851, retaining the position until 1856; chief justice of the Court of Common Pleas in 1856, and England's Lord Chief Justice in 1859, holding office until his death. He was knighted in 1850, and was the British representative at the "*Alabama* case" arbitration at Geneva in 1871–72. He dissented from the award of the arbitrators for legal reasons, holding that in the case of the *Florida* and that of the *Shenandoah* the responsibility of the government had not been proved. As a barrister he conducted many famous cases. He prosecuted Palmer, the Rugeley poisoner, and as a judge presided over the trial of the Wainwright murder case and the trial of Arthur Orton for perjury. His charge in this last occupied twenty days in delivery, and was a model of lucid statement of evidence.

COCKCHAFER (*Melolontha vulgaris*). See COLEOPTERA, Vol. VI, pp. 131, 132.

COCKER, a small dog of the spaniel kind, with a thick, wavy coat. It is trained to start game in snipe and woodcock shooting. See *Spaniel*, under DOG, Vol. VII, p. 328.

COCKERILL, JOHN, an English manufacturer, and one of the greatest influences in commerce; born in Lancashire, England, Aug. 3, 1790; died at Warsaw, June 19, 1840. He was the son of William Cockerill, an inventor and machinist, who, in 1807, settled at Liège, in Belgium. John, with an elder brother, succeeded to his father's business in 1812; established a woolen factory in Berlin in 1815; in 1817 founded the famous works at Seraing, and invested heavily in various enterprises in all parts of Europe. His statue was erected at Seraing in 1871.

COCKERILL, JOHN A., an American journalist; born in Locustgrove, O., Dec. 5, 1845; died at Cairo, Egypt, April 10, 1896. He served in the Union army during the Civil War as a drummer. After the war he engaged in newspaper-work at Dayton, Hamilton and Cincinnati, Ohio; went to the scene of the Russo-Turkish war as special correspondent for the Cincinnati *Enquirer*. Upon his return to America in 1870, he, with Silas Hutchins, started the *Washington Post;* took the editorship of the St. Louis *Post-Dispatch* in 1879; became managing editor of the New York *World;* in 1891 purchased the *Commercial Advertiser*; and in 1894 became a member of the editorial staff of the New York *Herald*. He was on foreign duty for the *Herald* at the time of his death.

COCK-FIGHTING, a barbarous sport common among both the Greeks and Romans, as it still is common in India, the Malay countries and Spanish America. It flourished for fully six centuries in England, the cockpit at Whitehall having been erected and patronized by royalty. It is now pro-

hibited by statute both in England and the United States. The game-fowl is the favorite breed of fighting-cocks, and much art is displayed in the training of cocks and in trimming and preparing the cock for the combat. Young cocks are called stags, and are considered at their best when two years of age and from 3½ to 4½ pounds in weight. When prepared for battle their natural spurs are usually reinforced by steel spurs from two to three inches in length. Strange to say, cock-fighting was a specially sanctioned sport of some English public schools, the schoolmaster receiving a regular tax from the boys on the occasion, which was on Shrove Tuesday. It was so in the days of King Henry II; and Roger Ascham, in his *Schoolmaster* (1570), announced his intention, never fulfilled, of writing a *Book of the Cock-Pitte*, as "a kinde of pastime fitte for a gentleman."

COCKNEY, originally a child delicately nurtured, and hence applied to the citizens of luxurious towns, as opposed to the hardier inhabitants of the country. Strictly and popularly speaking, the term is applied to such natives of London, England, as are "born within the sound of Bow bells," that is, in the East End of London. These are popularly supposed to be unable to apply the aspirate properly.

COCK OF THE PLAINS (*Centrocercus urophasianus*), the largest American grouse. It lives on the Western plains among the wild sage (*Artemesia*), which forms its principal food and gives a bitter flavor to the flesh. It is often called sage-cock.

COCK OF THE ROCK, a beautiful South-American bird of the genus *Rupicola* and family of chatterers (*Cotingidæ*). The bird is orange-yellow in color and has a curious crest on the head. It lives in the interior mountainous regions. It is about the size of a common pigeon.

COCK OF THE WOODS, a species of grouse. See CAPERCALLY, Vol. V, pp. 53, 54.

COCKRAN, WILLIAM BOURKE, an American public man; born Feb. 28, 1854, in Ireland; emigrated to the United States in 1871; taught school for five years in Westchester County, New York, and was admitted to the bar of New York state in 1876. His ability as a lawyer gained for him a place on the New York commission for revising the judiciary clause of the state constitution. He was a leader in Tammany Hall, in national Democratic politics, and was a member from New York in the Fiftieth, Fifty-second and Fifty-third Congresses. His speeches in favor of sound money and against free silver in the Presidential campaign of 1896, were eloquent and forceful efforts.

COCKSCOMB, an annual plant of the family *Amarantaceæ*, a native of the East Indies. By gardeners the name is confined to *Celosia cristata*. It grows with an upright stem, which becomes flattened upward, expands and forms a wavy crest. The colors are various and often very brilliant.

COCKSFOOT-GRASS (*Dactylis*), a genus of grasses called cock's foot from the dense branches of the one-sided panicles. *D. glomerata* is a native of Europe, and has been introduced extensively into North America and elsewhere. It is valuable for hay, and forms an important part in almost all the best pastures, as it is much relished by cattle. It thrives on most kinds of soil and in situations too shady for many other grasses. It is cultivated extensively in America, where it is known as "orchard-grass."

COCOA-PLUM, the fruit of *Chrysobalanus icaco*, of the family *Rosaceæ*, and native of the West Indies and adjacent United States localities. Its edible, plum-like fruit has suggested the name.

COCOA POWDER. See GUNPOWDERS, in these Supplements.

COCOON, the silken sheath spun by the larvæ of many insects in passing into the pupa, or resting-stage. The arrangement of the threads and the completeness of the covering vary widely. The most typical and perfect cocoons are those of many moths, especially those of the silkworm. The delicacy, neatness and labor exhibited by these last make them as marvelous as they are useful. See also BUTTERFLIES, Vol. IV, pp. 594, 596.

COCO RIVER, also called, in parts, Wauks and Segovia, a river of Nicaragua, which rises in western Segovia, in the northern part of the country, and takes a tortuous northeasterly course through the valley formed by the Teluca and the Tompocenté mountains, and enters the Caribbean Sea at Cape Gracias à Dios. It is three hundred miles in length, flows through a narrow valley, and though it receives the waters of many tributaries, it does not carry a body of water at all proportionate to its length.

COCOS ISLANDS. See KEELING ISLANDS, Vol. XIV, p. 26.

CODAZZI, AUGUSTIN, an Italian engineer; born in 1792, in Lugo, Italy; died in Colombia, South America, in June, 1859. He served under Napoleon in the Italian army. He moved to America in 1817 and participated in the Venezuelan revolution; entered the artillery service of Colombia as engineer; for the nine years following 1831 was in the employ of Venezuela; from that time until his death served various South American republics in exploring expeditions and surveys.

COD, CAPE, a peninsula of the coast of Massachusetts. See MASSACHUSETTS, Vol. XV, pp. 611–612.

CODEINE, an opium alkaloid obtained from poppy-heads. It is a white crystalline substance, similar to morphin, but much feebler in its action. See OPIUM, Vol. XVII, p. 793.

CODEX, a name applied to ancient manuscripts, especially of the classics or of the Scriptures. Of the latter class the principal are the *Codex Sinaiticus*, discovered in 1844 and 1859 in the monastery of Mount Sinai by Tischendorf, and the *Codex Vaticanus*, both of the fourth century; and the *Codex Alexandrinus* and the *Codex Ephraemi* of the fifth century. See PALÆOGRAPHY, Vol. XVIII, pp. 143, 144.

CODEX ALEXANDRINUS. See ALEXANDRIAN MS., Vol. I, p. 496.

CODICIL, a supplement to a will made for the purpose of altering its terms or making qualifications

or additions thereto. A codicil must be executed with the same formality as a will, and when properly executed becomes a part of the will. There may be several codicils to the same will, and each codicil operates as a republication of the will and the preceding codicils. A codicil properly executed will serve to rectify a defective execution of the will, if sufficient reference is made in the codicil to clearly identify the will. Unless it be affirmatively shown that the testator intended to have the codicil operate separately from the will, a destruction of the will by the testator will revoke the codicil. See WILL, Vol. XXIV, p. 570.

CODLING-MOTH (*Carpocapsa pomonella*), a small moth which occurs wherever apples are grown. The perfect insect flies at night and deposits its eggs in the young fruit. The larva feeds on the core of the fruit, arresting its growth and causing it to fall prematurely.

CODY, WILLIAM FREDERICK, an American frontiersman and scout, was born in Scott County, Iowa, Feb. 26, 1845. His early years were passed on the frontier in the midst of Indian alarms. During the Civil War he rendered service as a Union scout for several commanders. On the construction of the Union Pacific railroad young Cody attached himself to a camp of United States troops protecting the laborers, and won his sobriquet of "Buffalo Bill" by taking a contract to supply the entire force with fresh buffalo-meat for a certain period, killing, under one contract with the Goddard Brothers, 4,280 buffalos. Involved in repeated contests with the Indians, he became a noted frontier character, whose coolness and peaceable disposition were only equaled by his bravery in combat. On one occasion he killed the noted Cheyenne chief, Yellow Hand, in the presence of Indians and troops. He became known to juvenile America in the stories of Western adventure written by E. Z. C. Judson ("Ned Buntline"), and, with the advance of civilization, finding his occupation as a scout gone, Cody took for a while to the stage. He left the boards on the slightest Indian alarm, and on one occasion rode to the front in the gaudy trappings of the sensational drama in which he had been appearing. Associating himself with Nate Saulsbury, and observing with considerable business instinct the rapid extinction of the frontiersman who won the West, Cody collected a band of Indians, cowboys, rough-riders, unbroken bronchos and a small herd of buffalos and commenced a series of exhibitions in the principal towns of the American continent. His "Wild West," as he called it, rapidly grew in popular favor. As recreation for the youth and reminiscence for the elders, he played to huge audiences in almost every town of the Union, and undertook a series of tours through the principal cities of Europe. Here his fame as a scout brought him in contact with the crowned heads of the world, and his trip well sustained his reputation. At the World's Columbian Exposition of 1893 he met with considerable success. At this period one of his associates, John M. Burke ("Arizona John"), published a biography of his leader, under the title of *Buffalo Bill, from Prairie to Palace*, while at the same time his first employer, the veteran Alexander Majors, also dealt eulogistically with Cody in a book entitled *Seventy Years on the Frontier*. Eliminating the glare of the footlights and the advertising devices of an aspirant for popular favor, Cody must still be considered as a considerable factor with others in the winning of the West and as a typical instance of the fearless rider of the plains.

W. F. CODY.

COE COLLEGE, an institution of learning, founded at Cedar Rapids, Iowa, in 1881, and conducted under the auspices of the Presbyterian Church. In 1898 there were 11 instructors and 182 students in attendance. The library contains 2,500 volumes. The total productive funds of the institution amount to $55,000. Its income is $9,000 per annum. Dr. James Marshall, who was president of the college for a long time, died Sept. 11, 1896.

COE, GEORGE SIMMONS, an American financier; born in Newport, R. I., March 27, 1817. He began commercial life as a bank clerk in 1834, and was engaged in the banking business until the year 1894. In 1854 he became connected with the American Exchange National Bank, and first as vice-president and later as president had active charge of that institution for many years. In 1858 he was instrumental in organizing the New York clearing-house banks into an association which, by its system of certificates, based upon the best assets of each corporation, carried them safely through the troublous times of the war. In 1881 he was elected president of the National Banking Association. Died in Englewood, N. J., May 3, 1896.

CŒLESYRIA. See LEBANON, Vol. XIV, pp. 393–94.

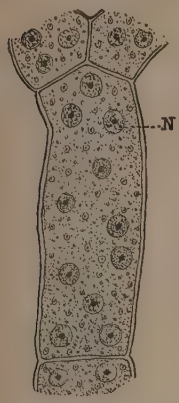
COELHO, FRANCISCO ADOLPHO, Portuguese philologist; born in 1847, at Coimbra; appointed professor of comparative philology at Lisbon, in 1878. His *Origem da Lingua Portugueza; Contos Populares Portuguezes;* and *Bibliotheca d' Educação Nacional*, are representative of his work as a philologist, as an editor and as an educator, respectively.

COELHO, GONZALO, one of the Portuguese navigators of the time of Columbus. The first that is recorded of him is that in 1488 he was in command of a vessel which brought one of the Senegambian chiefs to Lisbon as a prisoner. Next, in 1503, he was placed in charge of a fleet of six vessels to find a route to the Moluccas to the south of Santa Cruz, Brazil. He returned from this voyage in 1506. During his absence he explored the coast of South America as far south as Rio Janeiro. The record of these voyages makes up all that is known of his life.

CŒLIUS OR CÆLIUS ANTIPATER, a Roman historian, the author of the *Annales*, which were edited by Brutus. He lived about 123 B.C. The *Annales* contain an account of the second Punic war, of great value. See also LIVY, Vol. XIV, p. 729.

CŒLOM. See EMBRYOLOGY, Vol. VIII, pp. 167, 168.

CŒNOCYTE, a name applied to a plant-body or part of a body in which nuclear division has occurred, but has not been accompanied by the formation of cell-walls. The body or part is accordingly unseptate, that is, without partition-walls, although it may be composed of numbers of protoplasmic units which in other plants are separated from one another by cell-walls. Such a plant or such a part is a "cœnocyte," or is said to be "cœnocytic." Notable illustrations of a cœnocyte body are found among the phycomycete fungi and siphonaceous algæ; of cœnocyte parts in *Cladophora*, *Hydrodictyon*, etc., other algæ; although the cœnocytic condition is not wanting in even the highest plants.



A cell of *Cladophora*, showing cœnocytic character, containing 11 nuclei (N). (Original.)

COERCION AND COERCION ACTS. See HOME RULE, in the Supplements.

CŒREBIDÆ, a family of oscine passerine birds found in the warmer parts of America, popularly known as the honey-creepers. They are so closely related to the American warblers that many ornithologists dispute the division into separate families.

COEYMANS, a small railroad town of Albany County, southeastern New York, where the West Shore railroad bends westward toward Buffalo, while its Albany branch keeps on northward. Soap, straw-paper and brooms are manufactured. There are flagstone-quarries here, and also a mineral spring. Population 1890, 963.

COFFEE-BUG (*Lecanium caffeæ*), an insect of the Coccus family, which lives on the coffee-tree and is extremely destructive to coffee plantations.

COFFEE-TREE OR KENTUCKY COFFEE, a leguminous tree of the United States, often growing to a large size, the seeds of which have been sometimes used as a substitute for coffee. The single species is *Gymnocladus Canadensis*, found chiefly in the Mississippi basin, east of the prairie region. Although closely related to the "honey-locust," it is a tall, thornless tree, with large twice-pinnate leaves, small, greenish flowers in narrow racemes, and large, tough linear pods five to ten inches long. It is a fine ornamental and timber tree.

COFFER-FISH, a fish of the family *Ostraciontidæ*, often known as trunk-fishes. These fishes have all the body except the tail incased in a coat of mail, composed of large hexagonal plates, which are firmly interlocked. They are often used as food.

COFFEYVILLE, a railway city of Kansas, on the line of the Santa Fé and Missouri Pacific railroads, and a shipping-point for the Indian Territory. It is in Montgomery County. Coal and natural gas are found here. Population 1890, 2,282.

COFFIN, CHARLES, a French writer of Latin poetry; born in 1676, in Buzancy, France; died June 20, 1749, in Paris. He was principal of the Collège Dormans-Beauvais from 1712 until 1718, when he was chosen rector of the University of Paris, a position he retained until the time of his death. He wrote a number of drinking-songs, and, later, Latin hymns, some of which are in use to-day. These hymns were included by Cardinal Vintimilli, in 1735, in the Paris Breviary. Translations are to be found in some of the English collections.

COFFIN, CHARLES CARLETON, war correspondent, author, and lecturer; born July 26, 1823, in Boscawen, N. H.; died in Brookline, Mass., March 2, 1896; correspondent during the Civil War for the Boston *Journal*. He wrote a number of popular histories of the war, generally suited to young people. These works include *Days and Nights on the Battlefield* (1864); *Boys of '76* (1879); and *Freedom Triumphant* (1891).

COFFIN, SIR ISAAC, a British admiral; born in Boston, Massachusetts, May 16, 1759; died in England, July 23, 1839. He entered the navy in 1773 and served against the Americans during their struggle for liberty. He was appointed vice-admiral in 1808 and admiral in 1814. He was dismissed from the navy in 1788, having been found guilty of signing a false muster, but was reinstated almost immediately. After the war he visited his native land and endowed the Coffin School at Nantucket.

COFFIN, WILLIAM ANDERSON, an American artist; born in Allegheny City, Pennsylvania, July 31, 1855. He studied under Bonnat in Paris; obtained a third-class medal there, at the exposition of 1889. Principal works: *Close of Day; September Breeze; A Pennsylvania Farm; After the Thunder Shower;* and *Evening*.

COGALNICEANU, MICHEL, a Roumanian statesman; born in 1806; died in Paris, July 5, 1891. At an early age he became professor of national history at Jassy. A leader in the Jassy revolution of 1848, he was exiled for a number of years. He was largely instrumental in the union of the provinces of the Danube. In 1864 he was president of the Cabinet, and from 1868 to 1870 was again a member of the Cabinet, as Minister of Internal Affairs. In 1876 he was made Minister of Foreign Affairs; later, ambassador to France, and in 1879 he became Senator. During the whole of his career he was a Liberal, and to his fearlessness are due many of the political and religious reforms of Roumania. He wrote some valuable histories, the most important being his *Histoire de la Valachie et de la Moldavie*, and his books on the gipsies, their origin, language, etc.

COGGESHALL, a market town in the county of Essex, England, situated on the river Blackwater, 44 miles N.E. of London. The town consists of Great and Little Coggeshall, connected by a bridge across the river, and contains a beautiful church, St. Peter's, restored in 1868, a grammar school endowed by Sir Robert Hitcham, a mechanic's institute and a public library. Its manufactures are chiefly silk, velvets, patent isinglass and gelatine. In 1142 King Stephen here founded a Cistercian abbey, part of the ground plan of which was excavated and examined in 1865. Population, 3,109.

COGNOVIT, a legal term signifying a written

confession of the plaintiff's cause of action, authorizing him to take judgment for an amount named. It is usually signed by the defendant, after a suit has been commenced against him, or by an attorney authorized by warrant of attorney to act for him. A warrant of attorney authorizing some attorney therein named, or any attorney of record, to enter the appearance of the defendant in any suit brought on account of the cause of action set forth in the instrument, and to confess judgment against the defendant at any time, or at a specified time in case he fails to meet the obligation, is frequently executed as a part of a note or other evidence of indebtedness. Such warrant of attorney gives the attorney named, or if none is named, any attorney, the right to execute a *cognovit* authorizing the entry of judgment against the debtor. This form of warrant of attorney is of frequent use in recent times throughout the United States, in order to give the creditor greater security, and to avoid delay in case he shall deem it necessary to obtain judgment.

COGSWELL, Jonathan, an American Congregational clergyman; born Sept. 3, 1782, in Rowley, Massachusetts; died in New Brunswick, New Jersey, Aug. 1, 1864; was graduated at Harvard in 1806; tutor at Bowdoin from 1807 to 1809; was graduated with the first class at Andover Theological Seminary in 1810; pastor at Saco, Maine, until 1828; at Berlin, Connecticut, until 1834; professor of ecclesiastical history in the Connecticut Theological Institute at East Windsor for ten years. He afterward retired. He inherited a fortune from his brother and gave liberally to various church societies. He wrote a number of books, which include *Hebrew Theocracy* (1848); *Godliness a Mystery* (1857); and *The Appropriate Work of the Holy Spirit* (1859).

COGSWELL, Joseph Green, an American educator and librarian; born in Ipswich, Massachusetts, Sept. 27, 1786; died Nov. 26, 1871, in Cambridge, Massachusetts; graduated at Harvard in 1806; tutor at Harvard from 1813 to 1815; spent two years at Göttingen University, Germany; in 1820 appointed professor of geology and mineralogy at Harvard; established, with Bancroft, the Round Hill School at Northampton, Massachusetts; editor of the New York *Review* for a few years; librarian of the Astor Library from 1848 to 1860. His bibliographical work did much for American literature, and his scientific collections enriched the museum of Harvard College. He was a constant contributor to the better magazines of his day.

COHN, Ferdinand Julius, a German botanist; born in Breslau, Jan. 24, 1828. In 1850 he became private tutor and in 1870 professor of botany in the Breslau University. He belonged to the school of Schleiden, which endeavored to trace back to the development of the vegetable cell the origin of life in plants, and he devoted himself to the study of the line of demarcation between vegetable and animal life. His researches on fermentation, on the active agents of putrefaction, on miasmas, and on microbes in contagious diseases, have attracted wide attention. Among his monographs the best known are *Untersuchungen über die Entwickelung der Mikroskopischen Algen und Pilze* (1854); *Kleine Untersuchungen über Bacteria* (1872–75). He founded (1875) and edited in Breslau a special periodical entitled *Beiträge zur Biologie der Planzen.*

COHNHEIM, Julius Friedrich, a German pathologist; born in Demmin, Prussia, July 20, 1839; died at Leipsic, Aug. 14, 1884. He practiced medicine for a while, and in 1864 became connected with the Berlin Charity Hospital. In 1868 he became professor of pathology in the University of Kiel, in 1872 at Breslau, and in 1878 at Leipsic. He made many important discoveries in pathology, especially in regard to pus corpuscles, and wrote several books on this subject; among them, *Tuberculosis*, from the infection-theory standpoint, and *Introduction to General Pathology.*

COHOSH, the Indian name of a number of plants used in medicine, the principal of which are *Cimicifuga racemosa*, *Actæa alba* and *spicata*, and *Caulophyllum thalietroides.* The first two belong to *Ranunculaceæ*, or the "crowfoot family"; the last to *Berberidaceæ*, or "barberry family."

COHUNE OIL, a fixed oil obtained from the kernel of the fruit of *Attalea Cohune*, a palm abundant in Honduras and on the Isthmus of Panama. The leaves are thirty feet in length, and each leaflet measures three feet, while the tree attains a height of only about forty feet. This oil is frequently used as a substitute for cocoanut-oil.

*COINAGE LAWS. The first coinage laws of the United States government were enacted in 1792. It provided two standards of value, one of gold, the other of silver,—the latter, of equal face value, to be 15 times greater in weight than the former. Under it, depositors of either metal could obtain at the mint, on equal terms, either gold or silver coins in payment therefor. This plan is known as free coinage. Under the ratio fixed by the act mentioned, an owner of silver could generally get more for his metal at the mint than in the market, and, consequently, silver came in for coinage pretty freely. At that time a Mexican Spanish dollar, containing about two per cent more silver than the United States standard dollar, was freely received in circulation, and astute brokers quietly changed the latter for these foreign pieces at home and abroad, exporting the inferior coin in great numbers for purpose of such exchange. The foreign pieces received were then deposited for coinage, yielding to the owner a profit of two per cent, but the process drove the United States dollar out of home-circulation. To prevent this abuse, President Jefferson, in 1805, stopped the coinage of the silver dollar pieces. Since that time no silver dollars have been coined for circulation under a free coinage law, those manufactured having been exclusively for exportation. The legalizing of foreign coins, as provided by Congress, and the undervaluation of gold pieces in comparison with silver, effectually kept the gold coin from circulation. To change this, and avowedly to bring gold into circulation, Congress, in 1834, reduced the weight of gold coins about seven per cent. The measure, which met with but little opposition in either house, was championed in the Senate as an administration measure by Senator Thomas H. Benton, and was approved by President Andrew

*Copyright, 1897, by The Werner Company.

Jackson, June 28, 1834. The law had the desired effect. Gold at once became the standard of value, and coins of that metal entered freely into circulation, to the exclusion of silver. Later, in 1853, authority was given the Secretary of the Treasury to purchase silver and coin it into fractional parts of a dollar, reduced in weight in order to keep them from being melted down. No opposition to this measure was developed, and it furnished the country, for the first time, with its own so-called subsidiary silver pieces, which would remain in circulation as long as the circulation was continued upon a gold basis.

The introduction of the demand notes of 1861 and the United States notes (greenbacks) of 1862 drove gold from circulation, except that enough remained for payment of duties, as required by law, at our ports of entry, for payment of coin interest on the public debt, and for general circulation in the Pacific states, where public sentiment would not permit the greenbacks to be used as money. Silver coins also disappeared from circulation.

The passage of the act of March 19, 1869, "to strengthen the public credit," by pledging the payment of public obligations in coin, would evidently, in a short time, require a largely increased coinage by the mints. The coinage laws as they then existed were scattered through the several volumes of United States statutes from 1792 to 1853, and in many respects were imperfect and conflicting. It was deemed advisable by the Treasury Department to revise and codify these laws, that the coinage of gold and silver, essential to carrying out the act of 1869, might be promptly executed. On April 25, 1870, a bill for the purpose was sent to Congress by the Secretary of the Treasury, from which the authority to coin the silver dollar was omitted, but provision was made for subsidiary silver coins. This bill, pending in Congress for three years, was the subject of much discussion, and on Feb. 12, 1873, became a law, practically with no opposition. In lieu of the silver dollar, authority was given to coin a trade dollar of 420 grains' weight, at the expense of the depositor. This coin, as its name indicates, was intended only for exportation. The depreciation in silver which followed enabled the depositor to put this coin into home circulation at a profit. The coin was made a legal tender to the amount of five dollars, but by an act approved July 22, 1876, Congress took from it its legal-tender quality, and at the same time authorized the Secretary of the Treasury to limit its coinage to its demand for exportation. The coinage of this dollar practically ceased in 1878, and its further issue was prohibited by law in 1887

The fall in the value of silver, in its relation with gold, could not be foreseen. Had the measure of 1873 not been enacted, the silver dollar would have become the standard of value in 1874, and would have remained so ever since, to the exclusion of gold. The further coinage of the silver dollar, however, on government account, as in the case of minor coins, has been carried on under the acts of Feb. 28, 1878, and July 12, 1890, to the extent of about $423,000,000. The entire amount coined previous to 1873 was only $8,031,238, and that mainly for exportation. No silver of any kind was in circulation when the act of 1873 was passed.

The average price, in gold, of the bullion in a silver dollar for the last two years has been about a half-dollar, and the change to a silver standard which would unquestionably ensue from the free coinage of both metals at a ratio of 16 to 1 would enable the debtor class to satisfy their obligations under a new standard having a purchasing power of about one half of the present (1896) one. The result of the experiment already made, of purchasing, for more than three years, the domestic product of silver, and burying it in the public vaults with a view to enhance the price of that metal, should warn men against hoping that any legislation will be likely to effect any considerable increase in its price. The average price of the silver in a dollar fell from $0.806 in 1890 to $0.603 in 1893, or about 25 per cent, though the government was absorbing in its vaults nearly all the domestic production, leaving the supply for the arts and manufactures to importation. No different result could be expected from free coinage. See also FINANCES OF THE UNITED STATES, in these Supplements. JOHN SHERMAN.

*COINS OF THE UNITED STATES. The first coinage in the American colonies was in 1652, when the general court of Massachusetts established a mint in Boston, and John Hull, mint-master, struck silver shillings, sixpences and threepences. All of these coins bore the device of the pine-tree. They were of the same fineness as the English coins of like denomination, but of less weight. This mint continued in operation for 36 years. After a while the "royal oak" was substituted for the pine-tree, in order to conciliate King Charles II, who disliked this minting by a colony. All the above-named coins bore the date of 1652. But twopenny pieces were added with the date of 1662. No other colony had a mint until 1659, when Lord Baltimore caused shillings, sixpences and groats to be coined for use in Maryland. James II issued ten coins for circulation in America, though few of these found their way hither. In 1722, 1723 and 1733 copper coins were minted in England with the legend "Rosa Americana." There were also copper halfpence issued in 1773 for circulation in Virginia, and in 1774 silver shillings were added. Florida and Louisiana had colonial coins of their own before they became parts of the United States.

After the Revolutionary War the Continental Congress passed an act, in 1786, which established a mint and regulated the value and alloy of the national coin. The government prescribed the device for copper coin the next year. Under this authority the so-called "Franklin penny," with the legend, "Mind your business," was made by contract. By the Federal constitution, ratified in 1789, the right of coining money was transferred from the states to the United States. Under this constitution the United States mint was established at Philadelphia in 1792, and the regular coinage began in the following year. Congress had, by an act of Aug. 8, 1786, and a resolution of July 6, 1787, established the dollar as the monetary unit.

* Copyright, 1897, by The Werner Company.

The following table gives the weight and fineness of all the denominations used in the United States. It also shows the dates of the various acts of Congress which authorized their issue; what length of time each issue continued, when it was discontinued, when, as in certain instances, the issue was resumed, as well as the metals of which they are composed:

Coins.	Date of Law.	Weight, Grains.	Fineness.
GOLD.			
Double eagle	Mar. 3, 1849	516	900
Eagle	April 2, 1792	270	916⅔
	June 28, 1834	258	899.225
	Jan. 18, 1837		900
Half-eagle	April 2, 1792	135	916⅔
	June 28, 1834	129	899.225
	Jan. 18, 1837		900
Quarter-eagle	April 2, 1792	67.5	916⅔
	June 28, 1834	64.5	899.925
	Jan. 18, 1837		900
3-dollar piece	Feb. 21, 1853	77.4	900
Dollar	March 3, 1849	25.8	900
SILVER.			
Dollar	April 2, 1792	416	892.4
	Jan. 18, 1837	412½	900
Discontinued	Feb. 12, 1873		
Reauthorized	Feb. 28, 1878		
Discontinued	Nov. 1, 1893		
Trade dollar	Feb. 12, 1873	420	900
Discontinued	1883		
Demonetized	July 22, 1876		
Half-dollar	April 2, 1792	208	892.4
	Jan. 18, 1837	206¼	900
	Feb. 21, 1853	192	
	Feb. 12, 1873	192.9	
Quarter-dollar	April 12, 1792	104	892.4
	Jan. 18, 1837	103⅛	900
	Feb. 21, 1853	96	
	Feb. 12, 1876	96.45	
20-cent	March 3, 1875	77.16	900
Discontinued	May 2, 1878		
Dime	April 2, 1792	41.6	892.4
	Jan. 18, 1837	41.25	900
	Feb. 21, 1853	38.4	
	Feb. 12, 1873	38.58	
Half-dime	April 2, 1792	20.8	892.4
	Jan. 18, 1837	20⅝	900
	Feb. 21, 1853	19.2	
Discontinued	Feb. 12, 1873		
3-cent	Mar. 3, 1851	12⅜	750
	Mar. 3, 1853	11.52	900
Discontinued	Feb. 12, 1873		
MINOR COINS.			
5-cent (nickel)	May 16, 1866	77.16	75% copper; 25% nickel.
3-cent (nickel)	March 3, 1865	30	75% copper; 25% nickel.
2-cent. (bronze)	April 22, 1792	96	95% copper; 5% tin and zinc.
Discontinued	Feb. 12, 1873		
Cent (copper)	April 2, 1792	264	
	Jan. 14, 1793	208	
	March 3, 1795	168	
Discontinued	Feb. 21, 1857		
Cent (nickel)	Feb. 21, 1857	72	88% copper; 12% nickel.
Discontinued	April 22, 1864		
Cent (bronze)	April 22, 1864	48	95% copper; 5% tin and zinc.
Half-cent (copper)	April 2, 1792	132	
	Jan. 14, 1793	104	
	March 3, 1795	84	
Discontinued	Feb. 21, 1857		

The etymology of the word *dollar* is the English form of the German word *thaler*, which is itself a contracted form or equivalent for Joachimsthal (Joachim's dale), at which place the silver used in the mintage was mined, toward the end of the fifteenth century. The name is applied to the German silver dollar (thaler); also to similar coins in the Netherlands and Norway and Sweden; to the large silver coin of Spain (the Spanish dollar, or peso); and to the silver coin which superseded the Spanish dollar in Spanish America. The dollar is the monetary unit of the United States and Canada,—in the former being represented by gold and silver coins as well as by notes, in the latter by notes alone. Newfoundland has in use a gold coin representing two dollars in value.

The act of April 2, 1792, besides establishing the coinage mint at Philadelphia, fixed the values of the coins, providing for "dollars or units, each to be of the value of a Spanish milled dollar," as that coin was then current in the United States, and containing 371¼ grains of pure silver, or 416 grains of standard silver. An act of Jan. 18, 1837, fixed the weight of the dollar at 412½ grains troy, nine tenths fine, the quantity of pure silver being the same as provided by the act of April 12, 1792. This dollar was undervalued, and quickly went out of circulation.

The trade dollar was a coin authorized by the act of 1873, having a weight of 420 grains, but ceased to be coined in 1883. It was intended for use in the trade with China and Japan. By an act of March 1, 1887, the Treasurer of the United States was authorized to redeem in standard silver dollars all trade dollars presented within six months following.

The coinage of gold dollars was directed by an act of March 3, 1849. These gold dollars consisted of 25.8 grains, nine tenths fine, 23.22 being pure gold. By the act of 1873 this gold dollar was declared the unit value of the United States, and the further coinage of the standard silver dollar was discontinued. The coinage of standard silver dollars was resumed in 1878, according to the act of February 28th of that year, known as the Bland-Allison Act, which directed the Secretary of the Treasury to purchase silver bullion to the amount of not less than $2,000,000, and not more than $4,000,000, per month, to be coined into standard silver dollars. This coinage was continued by the act of July 14, 1890, providing that the Secretary of the Treasury should purchase, from time to time, silver bullion to the aggregate amount of 4,500,000 ounces, or so much thereof as may be offered, each month. Nov. 1, 1893, the act repealing the purchasing clause of the act of 1890 was passed. Since that date the purchase of silver bullion by the government of the United States has consisted of the silver contained in gold deposits, the small fractions of silver for return in fine bars, the amount retained in payment of charges, surplus silver returned by the operative officers of the mints at the annual settlement, and mutilated domestic silver coin purchased for the subsidiary silver coinage under the provisions of section 3526 of the Revised Statutes.

The value of a United States silver dollar, as

measured by the market price of silver and the quantity of silver purchasable with a dollar at the average London price of silver, was, in 1873, $1.016; in 1878, $0.936; in 1890, $0.926, and in 1893, $0.655; and it has decreased since.

The standard fineness for both coins, silver and gold, is nine tenths, one tenth being alloy. The gold dollar is generally estimated at an exchangeable value of 4s. 2d. in Great Britain.

By the act of Congress establishing the United States mint, the following coins were authorized: *Gold*, eagle, half-eagle, quarter-eagle; *silver*, dollar, half-dollar, quarter-dollar, dime, half-dime; *copper*, cent, half-cent. Changes have been made at various times, not only in weight and fineness, but also in the metals used for the minor coins. At present the following coins are struck: *Gold*, double eagle, eagle, half-eagle, three-dollar, quarter-eagle, dollar; *silver*, dollar, half-dollar, quarter-dollar, dime; *minor coins*, of nickel and bronze, five-cent, three-cent and cent.

By the act of Feb. 12, 1873, the metric system was to a certain extent used in determining the weight of the silver coins. Thus the half-dollar was to weigh 12½ grams, the quarter-dollar 6¼ grams, the dime 2½ grams.

Up to 1849, eagles, or ten-dollar gold pieces, were the highest denomination authorized. But the discovery of gold in large quantity in California caused a demand for a larger coin, and the double eagle was authorized by act of March 3, 1849, and issued in 1850. By the same act gold dollars were also authorized. Besides the governmental issues, there were octagonal and ring dollars, and even gold half-dollars and quarter-dollars, issued in California. The Mormons in Utah also had gold coins of their own. These had peculiar devices, and their favorite inscription, "Holiness to the Lord." Although the United States constitution prohibits coining by the states, it has been held that individuals may issue coins which are not similar to the national coinage. In December, 1892, a special silver half-dollar was issued by the United States to commemorate the World's Fair at Chicago, the entire issue of 5,000,000 coins immediately selling at one dollar each.

J. F. CARGILL.

COKE, RICHARD, jurist and statesman; born in Williamsburg, Va., March 13, 1829; served in the Confederate army as private and captain, and in 1866 became judge of the supreme court of Texas. In 1873 and 1876 he was elected governor. In April, 1877, he was elected to the United States Senate, from Texas; and again in 1883 and 1889, but declined renomination in 1895. Died at Waco, Texas, May 14, 1897.

BISHOP COKE.

COKE, THOMAS, first bishop of the Methodist Episcopal Church; born at Brecon, in Wales, Sept. 9, 1747; graduated at Oxford in 1768, and settled as a curate in Somersetshire, England. Being dismissed by his rector for open-air preaching and holding cottage services, he joined the Methodists, and served as president of the English and Irish conferences in 1782, 1797 and 1805. In 1784 he arrived in New York, having been set apart by Wesley as "superintendent" of the societies in America. He made nine voyages to America, and died on the Indian Ocean, May 2, 1814, while on a missionary voyage to Ceylon, having devoted his life to the cause of Methodist foreign missions. Among his numerous writings are a *Life of Wesley*, *History of the West Indies; Commentary on the Holy Scriptures;* etc.

COL, a depression or pass in a mountain range. In those parts of the Alps where the French language prevails, the passes are usually named *cols*; as, the *Col-de-Balme*, the *Col-du-Géant*, etc.

COLA, KOLA OR GOORA NUT. See NUT, Vol. XVII, p. 664.

COLBAN, ADOLPHINE MARIE (SCHMIDT), a Norwegian novelist; born in Christiania, Norway, Dec. 18, 1814; died at Rome, March 27, 1884. She was left a widow at thirty, and obliged to earn her own living; visited Paris, and was employed by a journal there to go to Rome as Italian correspondent. She has written numerous novels, among which may be mentioned *I Live* (1877); *An Old Maid* (1879); *Cleopatra* (1880); and *Thyra* (1882).

COLBURN, WARREN, an American mathematician and educator; born March 1, 1793, in Dedham, Massachusetts; died Sept. 13, 1833, in Lowell, Massachusetts. He graduated at Harvard in 1820; for several years was superintendent of a manufacturing company at Waltham, Massachusetts; engaged in teaching at Lowell, and was examiner in mathematics at Harvard. He published *First Lessons in Intellectual Arithmetic*, an *Algebra* and a *Sequel* to the arithmetic.

COLBURN, ZERAH, an American mathematical prodigy; born Sept. 1, 1804, in Cabot, Vermont; died March 2, 1840, in Norwich, Vermont. At a very early age he was exhibited in America, England, Scotland, Ireland and France, mentally solving intricate problems with great facility. At the age of nine he was able to answer immediately questions like, What is $999{,}999^2 \times 49^2 \times 25$? In 1820 he became a teacher in London, performing astronomical calculations at the same time for Dr. Thomas Young, then secretary of the Board of Longitude. In 1825 he united with the Methodist Church and was for nine years an itinerant preacher. In 1835 he became professor of languages in Norwich University, Vermont, which position he held till his death. His remarkable faculty disappeared as he grew to manhood.

COLBY UNIVERSITY, formerly Waterville College; located at Waterville, Maine; chartered by the Baptist Church in 1813, the charter being taken under the laws of Massachusetts; reorganized under the laws of Maine in 1821. The name was changed in 1867 to Colby University, in honor of a Boston philanthropist, Gardner Colby, through whose generosity the institution had greatly prospered. The university is co-educational, but separate classes for each sex are conducted. The president in 1896 was the Rev. Nathaniel Butler. There were 15 in the

faculty in 1895, 260 students and 31,000 volumes in the library. Since the organization, 1,087 students have been graduated.

COLCHAGUA, a small province in southern central Chile, bounded by the provinces of O'Higgins on the north and Curicó on the south, and extending from the Andes to the sea. Area, 4,630 square miles; population 1885, 155,687. Its soil is very rich in the valley between the Andes and the Coast Range. Its capital is San Fernando, with 6,959 inhabitants.

COLCHESTER, a manufacturing town of New London County, southeastern Connecticut, on the Wood River Branch railroad. Bacon Academy is located here. Paper and India-rubber goods are manufactured. Population 1890, 2,988.

COLCHICINE, a powerful alkaloid poison. See COLCHICUM, Vol. VI, p. 125.

COLCOTHAR, a name given by the alchemists to the brownish-red peroxide of iron which remains in the retorts when green vitriol or the sulphate of iron is calcined. See COPPERAS, Vol. VI, p. 352.

COLDEN, CADWALLADER, a Scottish-American physician and American colonial governor; born Feb. 17, 1688, in Dunse, Scotland; died Sept. 28, 1776, on Long Island, New York. After studying medicine and mathematics in Europe, he moved to the United States in 1708 and practiced in Philadelphia till 1715, when he revisited London. He settled in New York City in 1718, and in the following year became surveyor-general of the colony and master in chancery. In 1755 he retired to a tract of land about nine miles from Newburgh, on the Hudson, where he gave his attention to farming and scientific pursuits. He administered the affairs of the province as president of the council in 1760, and in the following year was appointed lieutenant-governor of New York. He held this position till his death, and was many times at the head of affairs, through the absence or death of the various governors. His royalist sympathies and enforcement of the stamp tax aroused public feeling against him. He was a close student of natural history, and for many years carried on correspondence with Linnæus, to whom he sent many specimens of American flora. His memoirs on plants were published by Linnæus in the *Acta Upsaliensia*.

COLDEN, CADWALLADER DAVID, grandson of the preceding; an American lawyer; born April 4, 1769, in Springhill, Long Island; died Feb. 7, 1834, in Jersey City, New Jersey. In 1818 he was elected mayor of New York City; in 1820 was sent to Congress, and in 1824 to the state senate. He was one of the earliest promoters of improvements in the system of internal communications. He wrote several treatises and memoirs on canals and steamboat use, and published a *Life of Robert Fulton* (New York, 1817).

COLD HARBOR, a location in Hanover County, Virginia, 10 miles N.E. of Richmond. Here, in May and June, 1864, the Confederate and Union armies confronted each other and a series of engagements took place. The fight began June 1st and lasted until the evening of June 3d. General Grant of the Federal army had advanced from Spottsylvania to the Chickahominy. The troops under Sheridan occupied Cold Harbor, May 31st. June 1st, they were joined by forces from Butler's army. An assault on the Confederates was made, which, though partially successful, resulted in a loss of two thousand men to the Union. During the next day the Federal forces were intrenched and placed in position with but little fighting. June 3d an assault was made by the troops on the right flank of the Confederates. But little ground was gained, and seven thousand men were lost. The Federal troops had, however, closed in on the Confederate works and gained positions advantageous for the battles around Petersburg. During the Cold Harbor fighting, the Union loss was almost thirteen thousand, while the Confederate was not over two thousand.

COLD-PIT, in gardening, a simple contrivance for the preservation of half-hardy plants through the winter. It consists of a pit about three feet in depth, covered with a frame either thatched or glazed.

COLD SPRING, a village of Queens County, New York, situated on Long Island, on an inlet of the sound, on the Long Island railroad, about 30 miles E. of New York City. It contains a very successful artificial hatchery belonging to the United States Fish Commission. It was formerly an important whaling-port. Population, about 900.

COLD SPRING, a village of Putnam County, southeastern New York, on the New York Central and Hudson River railroad, situated among the Highlands, on the east bank of the Hudson, one mile from West Point. Cannon, brass castings and machinery are manufactured here.

COLDSTREAM GUARDS, a celebrated regiment of Foot Guards in the Household Brigade of the British army, its organization dating from an earlier period than that of any other regiment excepting the First Foot. Raised in 1660 by General Monk at Coldstream, at first it was called Monk's Regiment, but when Parliament gave a brigade of guards to Charles II, this corps was included in it, and the name was changed to Coldstream Guards.

COLDWATER, a town and the capital of Branch County, central southern Michigan, on the Lake Shore railway, 156 miles E. of Chicago. It has numerous manufactories, a public-school building which cost $100,000 and a state school for pauper children. Population 1895, 5,285.

COLE, GEORGE, a British landscape-painter; born in Portsmouth, England, in 1810; died in London, Sept. 7, 1883. He was a ship-painter by trade, but soon felt a desire to do a finer kind of work, and began to paint animals. His work in that line was first exhibited in London in 1840. Immediately he attracted the attention of artists, and ten years later found him a member of the Society of British Arts, of which, in 1878, he became the vice-president. Among his paintings are *Don Quixote and Sancho Panza* and *Loch Lubnaig*, both examples of his earlier work; *A River Scene, Sussex* (1874); *Evening on the Thames* (1877); and *Windsor Castle—Morning* (1878).

COLE, SIR HENRY, an English civil administrator and author; born at Bath, July 15, 1808; died April

18, 1882. He was educated at Christ's Hospital. He became assistant keeper of the records in 1838; was chairman of the Society of Arts; did valuable service on the committee of the exhibition of 1851; was the founder of South Kensington Museum, and in 1860 became director of that institution. He wrote much for newspapers and reviews, and under the name of "Felix Summerly," published a number of books for children, among which are *Alphabet of Quadrupeds; Heroic Tales of Ancient Greece;* and *Popular Fairy-Tales.*

COLE, THOMAS, an American landscape-painter; born at Bolton-le-Moors, England, Feb. 1, 1801; died in Catskill, New York, Feb. 11, 1848. He removed to America in 1819. In 1830 two of his pictures appeared in the Royal Academy, and he afterward made sketching tours through England, France and Italy; but all his best landscapes were from American subjects. Perhaps his most widely known picture is the *Voyage of Life.* It has been reproduced in engravings and used for illustrating popular books.

COLE, VICAT, an English landscape-painter; born at Portsmouth in 1833, and received early artistic instruction from his father, George Cole. His paintings were exhibited first in 1852, and six years later he was elected member of the Society of British Artists. His picture entitled *A Surrey Cornfield* greatly increased his reputation. Mr. Cole became an associate of the Royal Academy in 1870, and was elected royal academician in 1880. His last work was *The Pool of London.* He died Sept. 6, 1893, in London.

COLEBROOKE OR GRAND FALLS, a village of New Brunswick and a port of entry, situated near the Grand Falls of the St. John River, which is here crossed by a fine suspension bridge. Population, 1,597.

COLEMAN, LYMAN, an American author; born June 14, 1796, in Middlefield, Massachusetts; died March 16, 1882, at Easton, Pennsylvania. He was a tutor in Yale College from 1820 to 1825, studying theology at the same time. He preached for seven years in the Congregational Church at Belchertown, Massachusetts, and for five years was principal of Burr Seminary in Vermont, and later principal of the English department of Phillips Andover Academy. After a visit to Germany he taught German in Princeton College, and later in Amherst. He traveled in Europe, Egypt and Palestine in 1856, and on his return to America taught Latin and Greek in Lafayette College, Easton, Pennsylvania. Professor Coleman's publications were principally on Biblical subjects. Among them are *Ancient Christianity Exemplified, Antiquities of the Christian Church; Prelacy and Ritualism;* etc.

COLENSO, JOHN WILLIAM, an English colonial bishop; born Jan. 24, 1814, in St. Austell, Cornwall; died June 20, 1883, in Durban, Natal, Africa. In 1846 he became rector of Forncett St. Mary, Norfolk, and in 1854 was elected bishop of Natal. He published extensively on mathematical, religious and other topics. His book on *The Pentateuch* (1879) involved him in serious controversy, and futile attempts were made to depose him. His denial of the inspiration of the Old Testament, and questioning some of the works credited to Moses, were condemned by both the English and American Episcopal church. Bishop Colenso defended the cause of the Zulus in their struggle with the British. He published *Ten Weeks in Natal,* and commentaries.

COLENSO, WILLIAM, missionary to New Zealand, and scientist, cousin of the preceding; born in Penzance, Cornwall, in 1811. He was sent out to New Zealand by the Church Missionary Society to print the Bible in Maori. He printed the first book published in New Zealand, *The Epistles to the Ephesians and Philippians.* This was in 1835; from that time on he was engaged in missionary work. He was the only surviving witness of the signing of the treaty of Waitangi of 1840. He devoted much time to the study of the origin of the Maoris and their customs. He was an authority on the natural history of New Zealand, and in recognition of his services was made a fellow of the Royal Society. Died in New Zealand about Feb. 10, 1899.

COLEPEPPER, JOHN, a British statesman, a native of Sussex, England. But little is known of his history until his return for Kent in 1640 to the Long Parliament. In 1642 he became Chancellor of the Exchequer, a twelvemonth later master of the rolls, and in another twelvemonth Lord Colepepper. He died June 11, 1660.

COLERIDGE, DERWENT, an English clergyman, son of Samuel Taylor Coleridge; born Sept. 14, 1800, at Keswick, England; died April 2, 1883, at Torquay, England. In 1841 he became principal of St. Mark's College, Chelsea. While holding this position he was a prebendary of St. Paul's Cathedral, and later rector of Hanwell, Middlesex. He published *Lay Sermons* and *Notes on English Divines,* and edited *S. T. Coleridge's Dramatic Works.*

COLERIDGE, JOHN DUKE, BARON, an English jurist, son of JOHN TAYLOR COLERIDGE (q.v., Vol. VI, p. 135), was born Dec. 3, 1820, in the sylvan beauty of Ottery St. Mary, Devonshire, where the family had long been settled. He was educated at Eton and Balliol College, Oxford, and took a prominent part, while an undergraduate, in the theological controversies provoked by *Essays and Reviews.* Called to the bar in 1847, he speedily commanded attention as an eloquent and ingenious advocate, rather than as a profound jurist. Whiling away his spare moments with frequent contributions to the *Quarterly* and *Edinburgh Review,* he became recorder of Portsmouth in 1855, and in 1861 was called within the bar as a queen's counsel. He represented Exeter in the House of Commons from 1865 to 1873, and as Solicitor-General in the first Gladstone government, was in charge of a monumental measure of legal reform—the Judicature Act of 1870—in its passage through the Commons. In 1871 he was appointed Attorney-General, and after a brief tenure of office, was chosen, in November, 1873, chief justice of the Common Pleas, being raised to the peerage in December of that year as Baron Coleridge of Ottery St. Mary. On the death of Sir Alexander Cockburn in November, 1880, he became Lord Chief Justice of England. In 1883 he visited the United States in company with Lord Hannen, Lord Bowen

and Lord Russell, and on the invitation of the New York Bar Association. Highly gifted, scholarly and eloquent, yet his impulsive temperament impaired his judicial qualities. He shone rather as an advocate than as a wearer of ermine, and in no case more serenely than when, as an excellent French scholar, he cross-examined for 21 days the coarse Wagga-Wagga butcher, Arthur Orton, who posed as the lost Sir Roger C. D. Tichborne and claimed the family estates. His most noticeable judgments were those of the cases of Dudley and Stephens, in which he held guilty of murder two starving sailors who satisfied their pangs of hunger by killing and eating a cabin-boy; the Bradlaugh-Newdegate maintenance case; and the trial of Ramsey and Foote for blasphemous libel. In this last he stretched the English law of blasphemy to the utmost tolerance of its limits. His last years were embittered by dissensions and libel suits among his relatives. As a wit and *raconteur* he held high place. He died in London, June 1, 1894. See also TICHBORNE, in these Supplements.

COLES, ABRAHAM, an American author and physician; born Dec. 26, 1813, in Scotch Plains, New Jersey; died May 3, 1891, at Monterey, California. He studied medicine, and began his practice in 1835. He was in Paris during the insurrection of 1848, and wrote an account of it for the Newark *Advertiser;* published a translation of the *Dies Iræ; Microcosm, and Other Poems;* and *A New Rendering of the Hebrew Psalms into English Verse.*

COLES, EDWARD, a governor of Illinois; born in Albemarle County, Virginia, Dec. 15, 1786; died in Philadelphia, Pennsylvania, July 7, 1868. He was private secretary to President Madison for six years from 1810, and in 1817 went to Russia on a diplomatic mission. On his return he was appointed registrar of the United States land-office at Edwardsville, Illinois, and was governor of the state from 1823 to 1826, during his term of office preventing the pro-slavery party from obtaining control of the state. He went to Philadelphia in 1833, and lived there until his death.

COLEUS, an ornamental plant. See HORTICULTURE, Vol. XII, p. 266.

COLEWORT, a name given to some of the many cultivated varieties of the common cabbage (*Brassica oleracea*). The name is also applied to cabbages cut for use before their leaves have fully closed into heads.

SCHUYLER COLFAX.

COLFAX, SCHUYLER, an American statesman; born in New York City, March 23, 1823; died in Mankato, Minnesota, Jan. 13, 1885. In 1836 he removed and settled with his father's family in Indiana. In 1841 he was made deputy to his step-father, George W. Matthews, who was county auditor. Colfax held this position for eight years. He was for several years editor of the South Bend *Free Press.* In 1845, he, in company with A. W. West, bought the paper and changed its name to the *St. Joseph Valley Register,* which became the most influential Whig journal in northern Indiana. In 1848 he was secretary of the Whig convention in Baltimore which nominated Taylor for President. The next year he was a member of the convention to revise the constitution of the state of Indiana, and earnestly opposed a clause to prohibit free colored men from settling in that state. He was again a delegate to the Whig national convention in 1852, and, having joined the new Republican party, was elected to Congress in 1854 and continued in that office until 1869. In December, 1863, he was elected Speaker of the House and was twice reelected. In May, 1868, at the Chicago national Republican convention he was nominated for Vice-President of the United States, and in November was elected, taking his seat as president of the Senate, March 4, 1869. In 1871 President Grant offered him the place of Secretary of State, but he declined, in order to serve out his term as Vice-President. His later years were spent chiefly in retirement from active politics, but, yielding to popular demand, he made several successful tours in the lecture field.

COLFAX, a flourishing town of Whitman County, southeastern Washington, on the Union Pacific railroad, 85 miles S. of Spokane. It is the trade center of an extensive and fertile agricultural district. Population 1890, 1,649.

COLGATE, JAMES BOORMAN, American merchant and philanthropist; born in New York, March 4, 1818; for a time a member of the dry-goods firm of Colgate and Abbe, New York, but since 1872 has been the head of the banking firm of James B. Colgate and Company. He gave generously to Colgate University, Rochester University and other institutions, Colgate University alone receiving over a million dollars.

COLGATE UNIVERSITY, originally Madison University, but changed in 1889 to Colgate, in honor of

COLGATE UNIVERSITY.

James B. Colgate and family, by whose benefactions the institution has been benefited greatly. This university is the outgrowth of Hamilton Seminary, founded in 1820 at Hamilton, New York, which became Madison University in 1846. The endowment is nearly $2,000,000, in great part the gifts of J. B. Colgate. Since its first class, 1,260 have been graduated.

There were, in 1895, 34 in the faculty, 310 students, and 25,000 volumes in the library. The president in 1895 was George W. Smith.

COLISEUM OR COLOSSEUM. See AMPHITHEATRE, Vol. I, p. 774.

COLL, one of the western islands of Scotland, off the west coast of Mull, 2½ miles N.E. of Tiree Island. It is 12 miles in length. Population, 723; engaged in agriculture and fishing.

COLLADON, DANIEL, Swiss engineer and physicist; born in 1802 in Geneva; died there, July 3, 1893. He first attracted public attention by his writings on photometry, sound in water and the compressibility of liquids. He invented the compressed-air drill used in excavating the Mont Cenis tunnel, and to him is largely due the St. Gotthard tunnel. He was at one time professor at the Paris École des Arts, and for a short time professor of mechanics at Geneva. He was an officer of the Legion of Honor and a member of almost all the European honorary societies.

COLLAO, the name given to that part of southern Peru which is drained by the tributaries of Lake Titicaca, comprising most of the department of Puna. It consists of plains nowhere less than eleven thousand feet above the sea-level, and is surrounded by high snow-capped mountain chains.

COLLE, a town of Tuscany, western central Italy, on the Elsa, 24 miles S.W. of Florence. It has an old cathedral and castle. Population, 5,090.

COLLECT, a name given to certain brief and comprehensive prayers found in all liturgies of the Roman Catholic and Protestant Episcopal churches. The origin of the term is not certain. According to some, it is from these prayers being said in the congregation, or collection, of the people; to others, because they are a brief and comprehensive summary of many longer petitions collected into one. Such prayers are of ancient origin, mention being made of them by writers of the third century.

COLLEGE FRATERNITIES, societies of students in almost all the colleges and universities of the United States. These organizations are sometimes known as "Greek-letter societies," an appellation derived from the fact that the majority of the societies have taken for their names two or more Greek letters which, to the members of the order, have some special significance; as, for instance, *Beta Theta Pi*. The college fraternities are, with one exception, secret societies. The general purpose is association for social privileges and the benefits naturally to be derived from united effort. The term *fraternity*, although masculine, is also applied to the organizations of young women, properly designated as sororities. The fraternities are divided into the fraternity proper, the honorary fraternity and the professional. The professional fraternity, as the term implies, is confined to the students taking the various scientific and literary professional courses. The honorary fraternity selects its members from the members of the senior classes, as a reward of scholarship. The following descriptions have to do with the collegiate fraternities, which may be termed the fraternities proper. These fraternities are divided into national and local. The national fraternity is made up of allied branches, or "chapters," in a number of colleges. The branches are under one general government, and are known by the general collective name of the national organization, and are distinguished from one another by individual Greek letters. Generally, the first chapter chartered is given the name *Alpha*, and the others, in the order of their founding, the consecutive letters of the Greek alphabet. The chapter is then designated, for instance, the *Alpha* of *Beta Theta Pi*. The union of individual chapters thus gives the national organization great strength, and each chapter is made more stable. There is never more than one chapter of any fraternity in any one college, although the number of fraternities represented in some institutions amounts to 25 or 30. The local fraternities have but one chapter, which has no connection with any similar organization. The number of chapters in a national fraternity varies from 20 to 70 or 80. The number of members in a chapter varies from 8 to 25 or 30. The various fraternities have badges by which their members are known. A student does not sever his connection with his fraternity upon graduation at college, but becomes an alumni member, to distinguish him from the active men still in college. Recently, many of the larger fraternities have established alumni chapters in many of the larger cities, where members of the alumni are naturally to be found. These chapters hold regular meetings and keep up the general organization of the active chapter. Members of fraternities are selected from the student-body,—in some cases on account of scholarship entirely, in others on account of prominence in social life or athletics. A man is asked to join, and can never seek admission. This asking is known as "spiking." Often spirited contests for desirable men take place between rival organizations. The inducements offered and attentions shown such men are included in the term *rushing*. Should a member see fit to leave one fraternity and join another, the action of the second fraternity is called "lifting," and the man is "lifted." At times some fraternities have taken into membership persons not in college, but eminent in public life. This action is, however, discountenanced by the better organizations. A number of chapters in various colleges live in rented or owned houses known as "chapter-houses." The national fraternities, with few exceptions, publish some kind of a periodical, and also possess song-books, etc. The authorities of some educational institutions—Princeton College, for instance—exclude fraternities from the college. In other institutions the term of membership is governed by faculty regulations.

The first Greek-letter society formed was the *Phi Beta Kappa*, at William and Mary College, Virginia, in 1776. This was at first a secret society, but is now classed among the honorary fraternities. Since its foundation there have been organized 28 national fraternities, with 800 chapters. Among them are *Alpha Delta Phi*, founded in 1832, at Hamilton College, New York; *Kappa Alpha*, at Union College, New York, in 1825; *Beta Theta Pi*, at Miami College, Ohio, in 1839; *Delta Kappa Epsilon*, at Yale College, in 1844; and *Psi Upsilon*, at Union College,

New York, in 1833. There are 11 women's societies. *Pi Beta Phi*, the oldest, was founded at Monmouth, Illinois, in 1867. The professional societies number 16, with 50 chapters.

COLLEGE OF NEW JERSEY. See PRINCETON UNIVERSITY, in these Supplements.

COLLEGE POINT, a village of Queens County, southern New York, situated on the northern shore of Long Island, about ten miles E. of New York City. It contains a variety of manufactories and many fine residences of the business men of the metropolis. Population 1890, 6,127.

COLLEGES, HISTORY OF AMERICAN. See EDUCATION IN THE UNITED STATES, in these Supplements; see also college names, under separate titles.

COLLEGEVILLE, a village of Montgomery County, southeastern Pennsylvania, on the Perkiomen railroad, twenty miles from Philadelphia. It is the seat of Ursinus College (Reformed German) and of the Pennsylvania Female College. Permanent population, about 600.

COLLEGIANTS, a sect whose creed resembled that of the Friends, hence they were sometimes called the "Holland Quakers." They sprang up about 1619, in Holland, and in a few years established a central meeting-point at Rhynsburg, near Leyden, Holland. Here they held a yearly meeting. Among the people of this sect Spinoza, the philosopher, lived after his excommunication by the Jews of Amsterdam. He was attracted to them by their liberality in thought and simplicity in living. The founders and leaders were originally Arminians. They had no regular pastors and adopted no form of government. They believed in baptism by immersion. The name *Collegiants* was given them because they called their assemblies "colleges." The sect died out at the end of the sixteenth century.

COLLEGIATE CHURCHES, in England, one which, while not being a cathedral, nevertheless possesses a college or chapter, consisting of a dean or provost and canons, attached to them. They date from the ninth century, when such foundations in large towns became frequent. They are under the jurisdiction of the bishop of the diocese in which they are situated, and he exercises visitorial powers over them. Examples of such are Westminster Abbey and St. George's Chapel, Windsor. In the United States the term is applied to a collection of churches having their pastors in common, as the Dutch Collegiate Church of New York.

COLLEMBOLA. See INSECTS, Vol. XIII, p. 153.

COLLETT, JAKOBINE CAMILLA, authoress, sister of the Norwegian poet Wergeland (q.v., NORWAY, Vol. XVII, p. 590); born at Christiansand, Jan. 23, 1813; died at Christiania, Mar. 7, 1895. She was a novelist of wide reputation. Her works include *The Magistrate's Daughters; Tales; Against the Stream*; and *Last Leaves: Recollections and Confessions.*

COLLIER, JOHN PAYNE, an English Shakespearean critic and commentator; born in London, Jan. 11, 1789; died in Maidenhead, Sept. 17, 1883. While still a boy he became Parliamentary reporter for the London *Times* and subsequently for the *Morning Chronicle;* but his real literary career commenced in 1820 with the publication of *The Poetical Decameron.* The more important of his publications were a *History of English Dramatic Poetry to the Time of Shakespeare; Notes and Emendations to the Plays of Shakespeare; Bibliographical and Critical Account of the Rarest Books in the English Language* (1865); and *An Old Man's Diary Forty Years Ago* (1872). In one of his publications he announced the discovery of an extensive series of marginal annotations, in a seventeenth-century hand, on a copy of the second Shakespeare folio (1631–32), the famous Perkins folio. These annotations he soon placed in the text of his next edition of Shakespeare, and attempted to pass them as genuine Shakespeare emendations. This announcement caused a great commotion in the literary world, but it was subsequently shown that they were forgeries, and the discovery, after his death, of some manipulated books, in his own library, greatly injured his reputation.

COLLIMATOR, a subsidiary telescope used to detect or correct errors in collimation; that is, in directing the sight to a fixed object when adjusting for transit-observations. When the vertical thread in the field of view exactly coincides with the vertical axis of a telescope, the instrument is collimated vertically, and when the horizontal spider's thread just covers the horizontal axis, the instrument is correct in horizontal collimation. See also OPTICS, Vol. XVII, p. 800.

COLLIN D'HARLEVILLE, JEAN FRANÇOIS, a French poet and writer of comedies; born in 1755, at Maintenon, France; died in Paris, Feb. 24, 1806. His comedies were of such merit that they not only were successful during the life of the writer, but are popular to-day. His first drama was *The Inconstant Lover*, produced in 1786. His later works include *The Optimist; Old Bachelor;* and *Chateaus in Spain. Old Bachelor* is his best work.

COLLINGWOOD, a town of Simcoe, northern central Ontario, Canada, situated on the south shore of Georgian Bay, on the Grand Trunk railroad, 94 miles N.W. of Toronto. It has a large variety of manufactures, and is an important center of trade and transportation. Population 1891, 4,939.

COLLINGWOOD, CUTHBERT, British naturalist; born Dec. 25, 1826, at Greenwich, England; studied at Christ Church, Oxford, Edinburgh University, and in Paris and Vienna; from 1858 to 1866, professor of botany in the Liverpool Medical College and professor of biology in the School of Science. He traveled in China, Borneo and Singapore in 1866–67, on a voyage for studying marine zoölogy, sanctioned by the British Admiralty. He embodied the results of his investigations in *Rambles of a Naturalist on the Shores and Waters of the China Sea.* He is also the author of various scientific papers; among them, *Traveling Birds* and *A Vision of Creation.*

COLLINS, WILLIAM WILKIE, an English novelist; born in London, Jan. 8, 1824; died there, Sept. 23, 1889. He was educated partly at Highbury, but from 1836 to 1839 was with his parents in Italy. After his return to London he spent four years in business, but finding it uncongenial, he entered Lincoln's Inn as a student at law. Here his literary bent manifested itself in 1848, the *Life* of his father (WILLIAM COLLINS, 1787–1847, Vol. VI, p. 148) being his

earliest production. He now entered upon an active career, devoting himself principally to works of fiction, several of them being first published as serial stories, in *Household Words; All the Year Round;* the *Cornhill;* and other periodicals to which he contributed. He formed the acquaintance of Charles Dickens in 1850, and owed much to the help and encouragement of that writer. His best-known works are *Antonina; or, The Fall of Rome* (1850); *Basil* (1852); *Hide and Seek* (1854); *The Dead Secret* (1857); *The Woman in White* (1860); *No Name* (1862); *Armadale* (1866); *The Moonstone* (1868); *The New Magdalen* (1873); *The Law and the Lady* (1875); *Alice Warlock* (1875); *The Evil Genius;* and *The Guilty River* (1886). Doubtless the best of these productions was *The Woman in White,* and the reputation this masterpiece of fiction made for him in England spread rapidly to America and the Continent, until his readers could be found in every civilized country on the globe. The powerful interest of his novels always lay in the mystery that was continued to the end of them, and in the art by which the reader's attention was held fixed and curious through the succeeding chapters. He visited the United States in 1873–74, and the distinguished consideration with which he was received everywhere afforded him great pleasure.

WILKIE COLLINS.

COLLINSIA, a genus of handsome plants found chiefly on the Pacific Coast of the United States. They belong to the family *Scrophulariaceæ.* Several species are cultivated for the beauty of their flowers. *C. verna,* of the eastern United States, is a handsome little vernal plant with its upper petals white and the lower blue. It was named in honor of Zaccheus Collins of Philadelphia.

COLLINSON, Peter, British manufacturer and botanist; born at Hugal Hall, near Windermere, Jan. 14, 1694; died Aug. 11, 1768. Although he became an extensive manufacturer of hosiery, in connection with which he did a large business with the American colonies, he was distinguished chiefly as a botanist. To him Benjamin Franklin first wrote regarding his theories on electricity, and by him they were read to the British Society, the members of which scoffed at Franklin's, to them, absurd conclusions. He introduced numerous European plants into the United States and many American trees into England. A genus of labiate plants is named *Collinsonia,* after him.

COLLINSONIA, a North American genus of *Labiatæ,* of few species, the most common being *C. Canadensis,* a tall, large-leaved, strong-scented plant, of rich, moist woods, with panicled racemes of pale yellow flowers. Some common names are horse-balm, rich-weed and stone-root.

COLLINSVILLE, a manufacturing town of Hartford County, central northern Connecticut, on the Farmington River, and on the New York, New Haven and Hartford railroad, 13 miles W. of Hartford. Paper, plows, axes and cutlery are here manufactured. Population, 2,500.

COLLINSVILLE, a city of Madison County, southwestern Illinois, on the Terre Haute and Indianapolis railroad, pleasantly situated in the midst of a fertile agricultural district, 12 miles E. of St. Louis. Population, 3,498.

COLLISION, the act of striking or dashing together. In maritime law, although the term *collision* is applied to all cases of vessels running foul, technically it only applies to the act of two vessels striking together; when one vessel strikes against another, it is called "allision." In either case, the injured parties have, under the general maritime laws of all civilized nations, a claim against the offending vessel for any damage resulting. See Navigation, Vol. XVII, p. 277; Seamanship, Vol. XXI, p. 601; and Rule of the Road at Sea, in these Supplements.

COLLITZ, Hermann, German philologist; born Feb. 4, 1855, in Bleckede, Germany; studied at Berlin and Göttingen; in 1883 became assistant librarian at Halle, and in that year moved to the United States to take the position of professor of comparative philology at Bryn Mawr College, Pennsylvania. He has been a prolific writer, both in German and English. Among such of his writings as have attracted the most attention are *The Relationships of the Greek Dialects;* and *Modern Philology and the Explanation of the Changes of the Indo-Germanic Vowel.*

COLLOID, a name applied by Graham to any soluble substance which, when exposed to dialysis, does not pass through the porous membrane. Starch, gum, albumen and gelatine are examples of colloids. The name is used in contradistinction to "crystalloid." See also Diffusion, Vol. VII, p. 217.

COLLUSION, a deceitful agreement between two or more persons to defraud or prejudice a third person, or for some improper purpose. The most common cases of collusion occur in arrangements between bankrupts and their creditors, such as payment, by anticipation, to a favored creditor on the approach of bankruptcy, arrangements for granting preferences by circuitous transactions or otherwise. In judicial proceedings, collusion is an agreement between two persons that one should institute a suit against the other in order to obtain a judicial decision for some improper purpose. Judgments so obtained are void.

COLLYER, Robert, an Anglo-American clergyman; born in Keighly, Yorkshire, England, Dec. 8, 1823. In 1843 he became a local Methodist preacher, and the following year moved to the United States. In 1859 he united with the Unitarian Church and became a missionary in Chicago, Illinois. In 1860 he organized the Unity Church in that city, and in 1861 was a camp-inspector for the Sanitary Commission. After the war he returned to his charge in Chicago. In 1879 he became pastor of the Church of the Messiah, in New York City. In addition to several volumes of sermons, he has published *The Life That Now Is; A Man in Earnest; The Simple Truth; Talks to Young Men;* etc.

COLOBUS. See Ape, Vol. II, p. 151.

COLOCZA or KALOCSA, a town of southwestern Hungary, situated on the Danube, 68 miles S. of Budapest. It has a cathedral, a college and a gymnasium. Population, 16,302.

COLOGNE WATER. See Eau de Cologne, Vol. VII, p. 616.

COLOGNE YELLOW, a pigment composed of two parts of yellow chromate of lead, one of sulphate of lead and seven of sulphate of lime or gypsum.

COLOMBIA, Republic of, known from 1863 to 1886 as the "United States of Colombia," and since 1886 as the Republic of Colombia, the union of nine Central American states—Panama, Cauca, Tolima, Cundinamarca, Boyacá, Santander, Antioquia, the Magdalena and Bolivar. For their geographical position, early history etc., see Colombia, Vol. VI, pp. 152 et seq. The area of the republic to-day is 513,938 square miles, of which 330,756 square miles are north of the equator and the remainder south. The total population is about 4,500,000. A revolution took place in 1885, which changed the system of government, doing away with the sovereignty of the individual states and reducing them to simple departments, their presidents, elected by ballot, being reduced to governors under the direct control of the President of the republic and appointed by him. A new constitution was adopted, Aug. 4, 1886. Under it the legislative power rests with a Congress of two houses, the Senate and House of Representatives. The Senate consists of 27 members, three from each department, elected by the departmental legislatures. The House of Representatives is composed of 66 members, elected by vote of the people, on the basis of one representative for every 50,000 inhabitants. The President is elected by electoral colleges for a term of six years. He has a Cabinet of eight ministers, who are responsible to Congress, but chosen by the President. These ministers are in charge of the departments of the Treasury, Interior, Finance, War, Foreign Affairs and Public Instruction. The judicial authority is vested in a supreme court, composed of seven judges, appointed by the President, and holding office during good behavior, removable only by impeachment by the Senate; the district courts and circuit courts, appointed by the President upon the nomination of the supreme court. In each municipality there are as many judges as the municipal council may determine. The Congress assembles every two years; its members are elected for four years. Suffrage is limited to those male citizens who are able to read and write or who have an income of five hundred dollars a year or real estate worth fifteen hundred dollars. In each department there is a legislative body, known as the departmental assembly, composed of one deputy for each twelve thousand inhabitants, elected by direct vote of the citizens. This assembly convenes every two years in the capital of its department. Each department is divided into municipal districts, in charge of a municipal council, at whose head is the alcalde, the official representative of the governor. The only department whose government is in any way different from the system explained is Panama, which is ruled directly by the national government. The republic maintains a standing army of 5,500, with a reserve force of 120,000. Numerous schools have been established, which have an attendance of about 300,000. A national university has been established, which includes four colleges, with 1,083 students in attendance. In all of the cities, libraries have been founded, and some valuable collections are the result. At Bogotá, the capital, a city of 120,000 inhabitants, is the seat of an astronomical observatory at an elevation of 8,600 feet above sea-level. The Roman Catholic is the state religion, but freedom in religious belief is constitutional. Almost all Colombians embrace the state religion. The uncivilized Indians are idolaters.

The greatest industry of the republic is mining. The production of gold amounts to about $3,000,000 annually; that of silver, $1,250,000 annually. The unhealthy climate of the interior, where the mines are located principally, prevents active operations that would probably result in greater outputs. Salt-mining and the refining of the salt-waters of a number of springs is one of the greatest sources of revenue to the government. Agriculture engages the greater part of the population. The articles exported include coffee, cotton, tobacco, cacao and hides. Very little manufacturing is done. In some departments cattle-raising is engaged in to a great extent. In 1893 the exports amounted to $10,124,189, and the imports, $9,375,080. The national debt of the republic is about $35,000,000, made up as follows: Foreign debt, $12,000,000; domestic, $23,000,000, including the paper money in circulation. The estimated revenues for 1895–96 were $18,148,600, while the expenditures, it was estimated, would be $18,163,368. The principal sources of revenue, in addition to the customs duties, are from the salt-works, Panama railroad, stamp tax and slaughter-house tax. All deposits of rock-salt are the property of the nation. Legal-tender bills have been issued by the government through the National Bank of Colombia. The peso is the legal tender. In commerce with foreign nations the peso varies in value as does the 10-real peso; the 8-real peso is used in the republic. According to the ruling of 1892 of the United States Treasury, the peso is valued at $0.692. Other coins are the silver real, 2-real and ½-real; the nickel 1¼ cents, 2½ cents and 5 cents; gold condor and double condor. The value of the condor is $9.647 in United States money. The metric system of measurement is in use. The kilogram is the standard weight, equal to 2.2 pounds avoirdupois. In 1892 there were 218 miles of railroads in the republic, and in 1894, 6,835 miles of telegraph. Diplomatic relations are maintained with the principal nations of the world. Since 1887 an extradition treaty, with all the usual provisions of such treaties, has been in force with the United States. It is required by law that all foreign companies shall register their charters with the notary of the district in which the business is to be conducted. All firms must have a representative living in the republic, and a fixed office. The great Panama canal is within the jurisdiction of Colombia, and, when finished, will be of the greatest commercial importance to the republic.

COLOMBO-ROOT, the root of *Jateorhiza columba* of East Africa, a twining plant of the family *Menispermaceæ*. From the root is obtained a mild tonic. It is also written "calumba" and "columbo."

COLON, a department in the northeastern part of Honduras, extending from the Cuero River (long. 87° 10′) to the Rio Segovia, from the Caribbean Sea to the departments of Yoro and Olancho. Its surface in the western part is very broken, and is traversed by many lofty ranges of mountains. In its eastern part are large fertile plains, well adapted for agriculture and the raising of fruit and cattle. On the coast are several lagoons of considerable extent. Area, 7,000 square miles; population, 15,000; capital, Truxillo, with 2,500 inhabitants.

COLONEL, the chief officer of a regiment in the United States army, ranking next below brigadier-general and first above lieutenant-colonel. In Great Britain regimental colonels are general officers who have had a regimental command given to them as a reward for long service, and virtually as an honorary retirement. Under this system, except in the artillery and engineers, the position is a sinecure, the real commander being the lieutenant-colonel. In 1888 it was decided to discontinue these appointments as soon as those who have a vested right to succeed to them have been satisfied, and it has been decided that no officer shall obtain the rank of colonel except by brevet, or on being selected for certain appointments carrying with them that rank. In the German, Austrian and Russian armies, where the regiments are very large, the colonelcies are mostly honorary posts, held by members of royalty and other distinguished personages. In the United States the pay of a colonel varies, according to length of service, from $3,500 to $4,500. The pay of the British colonel is equivalent to $5,000.

COLONIA DO SANTISSIMO SACRAMENTO, a port of Uruguay, or Banda Oriental, capital of the department of Colonia. It is situated on the left bank of the Plata, about one hundred miles above Montevideo, the capital of the state. It is one of the oldest towns on the Plata, and has one of the best harbors on that estuary. It has considerable trade with Argentine, and with points in Uruguay. Population 1892, about 3,000.

COLONIAL ANIMALS OR COMPOUND ANIMALS. These terms are applied to groups or colonies of animals which have originated from a single ovum. The individual which develops directly from the ovum produces the others by processes of incomplete budding or fission, so that the individual animals remain more or less intimately united. Examples of colonial animals are found among the protozoa, sponges, corals, hydroids, worms, bryozoa and ascidians. Many colonial forms exhibit polymorphism or physiological division of labor to a greater or less degree.

COLONIAL COLLEGE, a British industrial school for training young men, preparatory to sending them to some of the British colonies. The institution is located at Hollesley Bay, Suffolk, England. Instruction is given in all branches of manual training, agriculture, surveying and veterinary science. A large farm covering 1,800 acres is owned by the college, and the income from it assists largely in the maintenance of the institution.

COLONIAL DAMES OF AMERICA. See COLONIAL SOCIETIES, in these Supplements.

COLONIAL OFFICE, that department of the executive branch of the government of Great Britain which has to do with the relations of the crown government with colonial dependencies. The chief officer is the Colonial Secretary, who is *ex officio* a member of the Cabinet, and whose appointment is political, the holder of the office changing with the changes in the government. The Colonial Secretary nominates the governors of colonies, subject to the ratification of the crown. All enactments of colonial legislatures are brought before him for approval or disapproval. All diplomatic relations of the colonies is governed by him. See MINISTRY, Vol. XVI, p. 473.

COLONIAL SOCIETIES. Under this head are included those organizations of descendants of men who took some part in the American Revolution, or who were of active service in the founding of the colonies. The general intent common to all these societies is the perpetuation of the memory of colonial history and the memory of the men who helped make that history. The first of the colonial societies was the *Society of the Cincinnati*, organized in May, 1783, by the officers of the Continental army, then encamped on the Hudson. There were a number of French officers in the army at the time, and the society was organized in part, as stated in the constitution of the society, "to perpetuate . . . the mutual friendships which have been formed." Thirteen states formed societies, and one was organized in France. At the time, the privilege of membership was confined to all Continental officers in good standing and all officers of the French auxiliaries. Honorary membership was granted all signers of the Declaration of Independence. Membership to-day descends to the eldest son, with the same conditions of inheritance as restricts the heirs to the English crown. There were, in 1895, eight state societies, and in 1893 the roll showed a membership of 499.

Similar were the purposes of the founding of the *Society of Tammany*, or *Columbian Order;* but the organizers, to some extent, were moved by a spirit of jealousy of what they termed the "aristocratic tendencies" of the Society of the Cincinnati, and also were inspired by political designs. The political phase soon was in the ascendency, and the organization of to-day is purely a political one. It was founded in 1789, in New York City. It never spread beyond the city.

The *Sons of the Revolution*, organized in 1876, in New York City, was the first of the dozen or more general colonial societies. Membership is confined to male descendants of any military or naval soldier and civil official of the thirteen original states who took some part in the Revolutionary struggle from 1775 to 1783. In 1895 there were 27 state societies, with a membership of 5,151.

The *Sons of the American Revolution* was founded in New York in 1889. Its purposes and rules are

the same as those of the Sons of the Revolution. In 1895 there were 30 societies, in as many states, with a membership of 5,492.

The *Naval Order of the United States* was instituted at Boston in 1890. The rules limit membership to officers of the United States navy who have taken part in some of the wars of the United States.

Lineal descendants of the *Mayflower* Pilgrims organized, in 1894, the *Society of Mayflower Descendants*, at New York. The purpose of the society is to preserve the records of those who came to America in the *Mayflower* on its first voyage in 1620. The descendants, over 18 years of age, of any of those passengers, and of all who signed the famous compact, are eligible to membership.

The *Society of Colonial Wars* was organized in 1892, and includes in its membership the male descendants of all who took any part, civil or military, in the founding and subsequent growth of the colonies from 1607 to 1775.

The *Military Order of Foreign Wars* was founded in 1895. It includes the descendants of all soldiers of the Revolutionary War, the war of 1812, the Mexican War and the war with Tripoli.

The *Colonial Dames of America*, *Daughters of the Revolution*, *Daughters of the American Revolution* and *United States Daughters* are organizations of women, and include the female descendants of all those Colonial and Revolutionary soldiers and men of civil prominence that are remembered in the constitutions of the male societies. These societies have all been organized since 1890. The *Daughters of the Revolution*, founded in 1891, had, in 1895, societies in 32 states. The *Daughters of the American Revolution*, founded in Washington, District of Columbia, in 1890, had 42 societies and a membership of over ten thousand in 1895. The *United States Daughters* was instituted in 1892. Its membership includes descendants of veterans of the War of 1812. The *Colonial Dames of America* was founded in 1893. It has 13 societies.

COLONIAL SYSTEM, a term applied to the regulations of the commercial maritime relations between a home government and its colonies. The phrase was used almost exclusively with respect to Great Britain. The establishment of free trade between the colonies and all countries has ended all such legislation. During the seventeenth and eighteenth centuries these laws and regulations, known in Great Britain as Navigation Acts, played an important part in bringing about some of the wars of those periods. The American Revolution was in part brought about by the enforcement of those regulations. At that time the struggle for commercial supremacy was at its height. Deeming the colonies to be solely for the benefit of the mother-countries, it was enacted by the European maritime nations that all exports and imports of the colonies should be carried in vessels belonging to the parent-country, and all trade must be carried on with that parent-country exclusively. These rules, while intended to encourage trade, prevented it. Until the middle of the eighteenth century it had been the custom of a nation at war to throw open the ports of its colonies to the vessels of neutral nations. But in 1756 England took the stand that such neutral vessels as engaged in trade with the colonies of an enemy were no longer neutral, and were to be considered a part of the shipping of the enemy, and therefore lawful prey. Shortly afterward, in order to avoid complications that constantly were arising, England took the still bolder stand that a neutral vessel that had taken a cargo at the port of an enemy, although it afterward touched at a neutral port and reshipped its cargo, was under the rule, and liable to seizure; in other words, that the voyage from the colonial port homeward was to be considered continuous. It was not until 1849 that the navigation acts were repealed; but before that time their provisions were no longer put into effect. While to England is given the credit for many of the maritime laws in relation to the system, Spain carried to the farthest extent the restricting of colonial trade. See also SHIPPING, Vol. XXI, pp. 827, 828.

COLONIAL WARS, SOCIETY OF. See COLONIAL SOCIETIES, in these Supplements.

COLONIZATION SOCIETY, THE AMERICAN, a society organized in 1816 by Bishop Meade of Virginia, Rev. Dr. Finley of New Jersey, Charles F. Mercer of Virginia, and others, for the purpose of transferring negroes from the United States and colonizing them in Africa. It was intended not only for the good of the negro, but also to relieve the South of the burden of the free negro population. The first president of the society was Bushrod Washington. Henry Clay was for many years president of the society. The first colonists, consisting of 86 persons, were sent in 1820 to the west coast of Africa, where they founded what in 1847 became the Republic of Liberia. The society merged into the abolition party in 1831, and its practical work terminated soon after the emancipation of the colored people of the United States.

COLONNA, CAPE (ancient Sunium Promontorium), a headland of Greece, forming the southmost point of Attica. Its summit, crowned by the ruins of the temple of Minerva, rises 270 feet above the water. Sixteen white marble columns, from which the cape derives its name, are still standing. See FALCONER, WILLIAM, Vol. IX, p. 4.

COLONSAY AND ORONSAY, two islands of the Argyllshire Hebrides, 16 miles N.N.W. of Port Askaig, in Islay, separated from each other by a sound 100 yards wide, and dry at low-water. Colonsay, which rises to a height of 493 feet, is 16 square miles in area; Oronsay, only 3. On the latter are a sculptured cross and a fourteenth-century Augustinian priory, with some curious effigies; whilst in the former are standing stones, a bone cave, Colonsay House (1722), and an obelisk to the memory of the lawyer, Duncan McNeill, Lord Colonsay (1794–1874). Near the center of the island of Colonsay is the beautiful Loch Fad. See also HEBRIDES, Vol. XI, p. 607.

COLOPHONY, a gum. See ROSIN, Vol. XX, p. 852.

COLORADO, the thirty-eighth state admitted to the Union, lies nearly midway between the Mississippi River and the Pacific Slope, and at nearly an

equal distance between British Columbia and Mexico. It is popularly called the "Centennial State," from the date of its admission, 1876. The area is 104,500 square miles, or 66,880,000 acres, of which about 26,000,000 acres are mountain lands, the remaining 40,880,000 acres mesa and valley lands. The climate is equable, and from the high altitude of the greater part of the state, dry and very agreeable, and beneficial to invalids, especially to those suffering with lung diseases. The average temperature, covering a period of five years, as recorded by the United States Signal Service, was as follows: January, 26.8°; February, 34.8°; March, 39.4°; April, 49°; May, 57.6°; June, 66.8°; July, 72.2°; August, 69.2°; September, 62.4°; October, 50°; November, 35.8°; December, 35.8°. The average number of cloudy days in a year is not more than forty. Health-resorts are numerous in the mountain regions, and mineral and thermal springs abound.

For a number of years the state has led in the production of the precious metals; almost every

STATE SEAL OF COLORADO.

known mineral is found within its borders, and mining has always been the chief occupation of the people. There are thousands of producing mines scattered throughout the length and breadth of the state, lodes of silver and gold seaming almost every mountain. There are also immense deposits of argentiferous lead ores, and for more than a decade the state has produced from forty to fifty per cent of the entire lead output of the whole country. One mine located at Leadville has yielded over $158,000,000 since its discovery. Of gold and silver alone Colorado has produced since 1859, $407,588,028, the increase each year over the preceding one being very marked. In 1872 the amount taken from the mines was $3,740,000, which had increased in 1892 to $32,342,571. The output of some of the gold-mines of the state has been little short of marvelous, the Robert E. Lee producing $118,500 worth of ore in 17 hours. On the opening of the Minnie mine at Leadville it was estimated that there was in sight $10,000,000 gross. In the early days of gold-mining the main work was done in placers, the only equipments necessary being the shovel, gold-pan and sluice-box, and in this way over $10,000,000 were taken during the first ten years of work. Subsequently, mines were sunk in the ground to varying depths, some being worked with profit as deep as 1,900 feet. Notwithstanding the rapid advances being made in agriculture and manufacturing, mining bids fair to continue to be the chief source of wealth for many years. The discovery of gold in the Cripple Creek district opened up one of the richest gold-fields in the world, and gave a new impetus to the mining industry in Colorado. (See CRIPPLE CREEK, in these Supplements.) Iron exists in great masses in many parts of the state, and is of the best quality. Bessemer steel has been produced at Pueblo for the past ten years; and the mills of that city, which is termed the Pittsburg of the West, turn out large quantities of the best quality of all kinds of iron made. The supply of copper, zinc, silica, cement, gypsum, onyx, kaolin and all kinds of valuable clays is beyond computation, as is that of an innumerable variety of commercial and manufactural minerals. The coal-fields of the state cover an area of almost forty thousand square miles, and the best anthracite and bituminous coal has been found in veins of great thickness, easy of access. Every town and city of the state has coal within close reach, and the mining is attended with small expense. The first record of the amount of coal produced was in 1873, when 69,977 tons were mined. In 1891 this had increased to 3,358,496 tons.

The parks of the state are great natural gardens, composed of broad, level valleys, once the beds of inland lakes or seas. The four largest of these, with their approximate area and elevations, are given as follows:

	AREA. SQUARE MILES.	ELEVATION. FEET.
North Park	2,500	9,000
Middle Park	3,000	8,500
South Park	2,200	9,500
San Luis Park	9,400	7,500

The soil of Colorado is so fertile that the possibilities of production are limited only by the water-supply. About 34,560,000 acres are arable and accessible to water. Early recognizing the importance of irrigation, efforts were put forth to inaugurate a system of canals so that the arable lands might have the advantages of the moisture denied by summer rains. Reports made in 1893 show that there were then in operation 12,400 miles of irrigating-canals, reclaiming 4,800,000 acres of otherwise arid land, and of this amount one half was then under cultivation, the remainder awaiting settlement and tillage. The leading crops, in the order of their importance as cultivated, are wheat, oats, alfalfa and potatoes, while rye, barley, tobacco, corn, fruits and hay are produced in great quantities. Garden vegetables give an enormous yield, and the small fruits are prolific to a high degree. Sorghum, buckwheat, navy beans, broom-corn, hops, sugar-beets, hemp and flax are also grown. Maximum results attained at the State Agricultural College have been: Wheat, 91 bushels per acre; rye, 52 bushels; oats, 102 bushels; Irish potatoes, 400 bushels; barley, 72 bushels; and corn, 67 bushels, shelled. Alfalfa leads all of the agricultural products of the state in tonnage and value. It affords the best of forage for stock and can be cut during every month of summer. For hay it is unexcelled, and yields from four to six tons per acre. The great strides made in stock-raising and farming generally are in a great measure due to the advantages derived from this plant, which flourishes at all altitudes below seven thousand feet. The climate is well adapted to fruit-

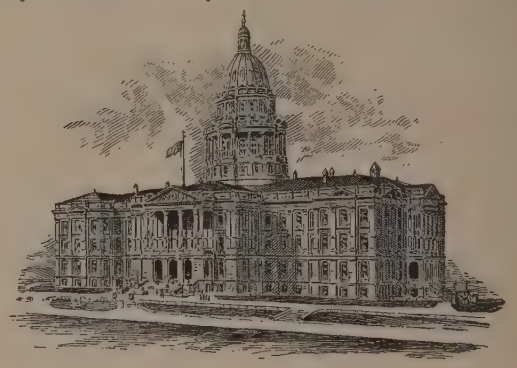
growing, and vineyards give generous yields of unsurpassed quality. Among the leading fruits are peaches, apples, pears, plums, cherries, nectarines and apricots, while among the small fruits are the blackberry, gooseberry, currant, raspberry and strawberry. The average orchard in full bearing gives profits as high as $500 per acre, and strawberries return a revenue of from $200 to $300 per acre. Large vineyards have given an average of $400 per acre for several seasons in succession. The value of the agricultural products of the state for 189 , was estimated at $75,000,000, and the fruit output for the same year amounted to $3,000,000; the wool-clip reached 12,000,000 pounds, valued at $3,000,000; and the potato crop was 150,000 tons, valued at $3,000,000. Cattle, horses, sheep and hogs are widely raised throughout the state. The total value of all kinds of live-stock in 1892 was given as $11,418,000. A profitable industry as yet in its infancy is that of dairy-farming. Bee-culture has also received much attention, the conditions for success being so advantageous as to invite the agriculturist to engage in it. The annual production of honey is now in excess of 500,000 pounds.

In 1891 the state had 640 manufacturing establishments, employing 19,621 hands, turning out products of the value of $70,027,854, and paying in wages $12,951,763. The city of Denver alone had 315 of these manufactories. A great part of the manufacturing is in connection with the mineral products of the state, the leading industries being brass-works, lead-works; foundries and machine-shops, making engines, boilers and mining machinery; iron-works, building materials, tin, sheet-iron and copper works, flouring-mills, furniture, etc.

Building-stone of the very best quality is found in abundance in many parts of the state, and, in addition to its use in Colorado structures, has been used in the construction of some of the principal buildings of Chicago, St. Louis, Omaha, Kansas City, Salt Lake City and various other places. Marble of the best quality and of all colors, in great quantities, has been found, and is extensively quarried. Petroleum has been discovered in several localities. In and near the town of Florence there are 27 producing wells, aggregating about 1,100 barrels per day, the entire product being refined at Florence.

The numerous railway systems in Colorado form a network of lines throughout the state, the total trackage in 1894 being 4,355 miles, assessed for taxation at $30,428,444. All of the different lines center in the city of Denver, making that place the greatest railway point west of Kansas City. The telegraph and telephone mileage in 1894 was 5,751, with an assessed valuation of $455,306.

In 1893 the school population of Colorado was 116,119, and the total value of school property, $5,790,770. From the general government the state received 3,500,000 acres of valuable land for school purposes, and from the sale of less than one third of this a permanent fund has arisen, now amounting to over $1,000,000. Since the admission of the state into the Union in 1876 there has been expended on the common schools alone an amount approximating $16,000,000. This does not include the State University, Agricultural College, School of Mines and the State Normal School, all of which are state institutions, and well sustained by legislative appropriation. The first-named of these is located at Boulder, the second at Fort Collins, the School of Mines at Golden and the State Normal School at Greeley. Other institutions of learning are the University of Denver, the Colorado College, at Colorado Springs; the Westminster University of Colorado, at Denver; the Presbyterian College of the Southwest, at Del Norte; the Longmont College, at Longmont; the Tillitson Academy, at Denver; St. John's College and Wolfe Hall, at Denver; and the Jesuit College of the Sacred Heart, at Highlands. There are numerous other institutions of learning and private schools of varied character, and in great numbers. The educational exhibits at the World's Fair received 29 prizes from the bureau of awards. There are 30 public libraries in the state, with about 64,000 volumes. The state institutions include the Industrial School for Boys, the Industrial School for Girls, the Insane Asylum, the Mute and Blind Institute, the Penitentiary, the Reformatory and the Soldiers and Sailors'



STATE CAPITOL, DENVER.

Home. The new capitol building, which was completed and occupied in 1894, cost more than $2,250,000, and is one of the finest structures of its kind in the West.

Woman suffrage prevails in Colorado, having been adopted in the election of 1893 by a majority of about 5,000 votes.

In 1894 the total assessed value of all property was $208,905,279.

The state stands thirty-first in population, the census of 1890 showing 404,468 whites, 7,730 colored, 1,083 Indians and 612 Chinese, a total of 412,198. The census of 1880 gave the population as 194,327; that of 1870, only 39,864.

The principal cities of the state are Denver, the capital; Pueblo, Colorado Springs, Leadville, Highlands, Aspen, Boulder, Cañon City, Durango, Cripple Creek, Salida, Ouray, Central City, Grand Junction, Fort Collins, Georgetown, Colorado City, Longmont.

The following is a list of the governors, with their respective terms of office:

Territorial. William Gilpin, 1861–62; John Evans, 1862–65; Alexander Cummings, 1865–67; A. Cameron Hunt, 1867–69; Edward M. McCook,

1869–73; Samuel H. Elbert, 1873–74; John L. Routt, 1874–76.

State. John L. Routt, 1876–79; Frederick W. Pitkin, 1879–83; James B. Grant, 1883–85; Benjamin H. Eaton, 1885–87; Alva Adams, 1887–89; Job A. Cooper, 1889–91; John L. Routt, 1891–93; Davis H. Waite, 1893–95; Albert W. McIntire, 1895–97; A. Adams, 1897. See COLORADO, Vol. VI, pp. 161–163.

COLORADO, a city and the capital of Mitchell County, northwestern central Texas, on the Texas and Pacific railroad, on the Colorado River, 70 miles W. of Abilene. It contains very extensive manufactories of salt and soda. Population 1890, 1,582.

COLORADO COLLEGE, situated at Colorado Springs, Colorado. It is a non-sectarian, co-educational institution, founded in 1874, and in 1896, under the presidency of W. F. Slocum, Jr., the principal educational institution of Colorado. Full collegiate courses are offered here, both in the classics and the sciences. The opportunity for scientific

COLORADO COLLEGE.

study is such, however, that it is expected that in time the school will be prominent in that direction. In 1895 there were 300 students of both sexes in attendance, with a faculty of 30 and a library of 20,000 volumes. The productive funds of the institution amounted to about $160,000 in 1895.

COLORADO DESERT, a very arid district in southern California, the whole length of which is traversed by the Southern Pacific railroad from San Bernardino on the north to Yuma on the south. The northern portion is known as Coahuila Valley and the southern as the Yuma Desert. The southern portion has the hottest climate of any point in the United States, the thermometer registering, during the summer months, as high as 134° F. The Coahuila Valley, it is thought, was formerly a part of the Gulf of California. A large portion of it lies below the level of the sea. The accepted theory is that the formation of the delta of the Colorado River cut off this valley from the Gulf of California, and the outlet of the river changing its position, the valley was left in its present unwatered condition.

COLORADO SPRINGS, capital of El Paso County, Colorado, a popular health-resort, 65 miles from Denver, and situated in the midst of the most beautiful scenery. It is only ten miles from Pike's Peak, whose commanding eminence towers above the landscape, and it is accessible by several lines of railroad. It is the seat of Colorado College. Six miles away is MANITOU, a summer resort for tourists and invalids, lying at the very foot of Pike's Peak, and between the two towns lies the famous valley known as the "Garden of the Gods." In Manitou, mineral springs abound, the scenery is picturesque beyond description, the climate is clear, and, alike to the scientific observer and the sojourner in search of health, this district offers every element of attraction. Population of Colorado Springs 1890, 11,140. The estimate for 1896 is over 16,000.

COLORADO, UNIVERSITY OF, a co-educational institution, the State University, situated at Boulder, Colorado, 28 miles N.W. of Denver. It was organized in 1877, and is supported by state taxes. In addition to the regular collegiate courses, instruction in law and medicine is given. The medical department is known as the Denver Medical College. The president in 1896 was James H. Baker. There were, in 1895, 70 in the faculty, 475 students and a library of 12,000 volumes. Since its organization, 333 have been graduated.

COLOR-BLINDNESS, a peculiar defect of sight, in which those who are affected are incapable of distinguishing different colors. To some, objects seem to be either light or dark, but gray is most usual. Others cannot distinguish either the primary colors from each other or from the secondary, confounding red with blue, blue with green, etc. The first class is rare, the second common. A distinguished chemist, Dalton (q.v., Vol. VI, p. 784), who himself suffered from color-blindness, was the first to draw attention to it, and hence the affection is frequently called Daltonism.

COLORED METHODIST CHURCHES. See METHODIST CHURCHES, in these Supplements.

COLOR PHOTOGRAPHY. See PHOTOGRAPHY, in these Supplements.

COLOR-PRINTING. Previous to May, 1895, printing in colors was a tedious and expensive process, involving an amount of patience and skill only appreciable by those familiar with the work. In that month there was marketed a commercially successful method of color-printing in three impressions, producing the effects previously obtainable only by a score or more of printings. The process can be used for all sorts of illustrations produced by photography and printing. The principle involved is, that if three photographs of a thing be taken respectively in red, blue and yellow light, and a plate be made from each photograph by some photomechanical process, the plates may then be printed in their appropriate color, one on top of the other, thus producing a print in the three primary colors of nature, and producing a combination involving all the colors of the original. The theory was understood as early as 1865, but the obstacles to successful execution were so numerous that many inventors gave up the problem after years of study. The results now obtained are not quite perfect, owing to the difficulty of securing exact shades of ink, and to the changes in color incident to printing one color on top of another, instead of blending them in, as nature does. Nevertheless the pictures made are vastly better than any previous three-color printings. The plates for the three negatives are color-sensitized by means of

three different dyes, each of which absorbs one third of the spectrum and reflects the other two thirds. In photographing, color-screens are used to assist in absorbing those rays which are not wanted for a particular plate. From the three photographs three half-tone electrotypes are taken—one for printing in each color. The plate from which the red and blue light was excluded in photographing is printed in yellow, the plate from which the yellow and red light was excluded is printed in blue, and the plate from which the blue and yellow light was excluded is printed in red. The result is a theoretically accurate reproduction of the scene in its natural colors.

C. H. COCHRANE.

COLOR-WHEEL. The Maxwell color-wheel is a device designed to aid in the exact definition and determination of colors. It consists of a set of colored cardboard disks, mounted so that they may be rotated rapidly. The disks are colored in vermilion, mineral-orange, light chrome-yellow, emerald-green, ultramarine-blue, black and white, and being made circular, they are mounted centrally upon the same axis. A straight slit is cut in each disk from the outer edge to the center, so that any other disk in the set can be pulled partially through the slit and made to overlap the top disk. In this way it is possible to exhibit a fraction of any or all of the color-disks at once. Then by rapidly rotating the disks by means of a belt-mechanism, the colors shown are blended into one. In use, if it is desired to determine the exact constituents of a shade of purple, the operator will overlap his red and blue and whirl the disks. If there is too much red, he will alter the disks and try again, and so on until he hits the same shade. He then stops the wheel and looks at a chart placed circumferentially in the rear of the disks, and is able to read off the percentages of his standard colors that go to make up the shade of purple he desires to match. He may telegraph this information to some distant place, with the certainty that the recipient, who understands the system, will be able to duplicate the color for him as accurately as he himself reproduced it on the color-wheel.

In connection with this color-wheel there has been prepared a table of typical colors, which are reproduced readily. For instance, cyan-blue is shown in the table to be composed of 21 parts white, 46 parts green and 33 parts blue; and mauve is produced with 47 parts white, 6 parts yellow, 9 parts green and 38 parts blue. These typical colors can all be reproduced exactly by any one having the table and the color-wheel, and thus it is now possible, in many kinds of business, to order special colors without sample, with a certainty of accuracy never before obtainable.

C. H. COCHRANE.

COLOSTRUM. See BEESTINGS, in these Supplements.

COLQUHOUN, ARCHIBALD ROSS, a British civil engineer and colonial commissioner; born at sea, off the Cape of Good Hope, in March, 1848. He is a son of Dr. Archibald Colquhoun of the East India Company. He received his education both in Scotland and on the Continent. He entered the India service as a civil engineer in the Public Works Department. While in India from 1871 to 1883, he was much interested in the connecting of British India with Siam and China. He made several exploring expeditions in the interest of that project. In 1883 he went to China as special correspondent of the London *Times*, and attracted attention by his letters and commercial suggestions. He again entered the India service in 1885, and until 1889 acted as deputy commissioner in Upper Burma. He was transferred to South Africa in 1889 and until 1891 took an active part in the colonization of Mashonaland, during his last year of residence there acting as chief magistrate of the colony. He was pensioned in 1893. Mr. Colquhoun has published valuable accounts of his travels in India, China and Africa. These descriptions are included in his books: *Across Chrysee* (1882); *Among the Shans* (1883); and *Matabeleland, and Our Position in South Africa* (1893).

COLQUHOUN, PATRICK, a British writer on political economy, and a practical reformer; born at Dumbarton, Scotland, March 14, 1745; died in London, April 25, 1820. He became provost of Glasgow in1782, and a police magistrate in London in 1792. He was a merchant and manufacturer of muslin.. He was the author of *Police of the Metropolis* (1795); *Population, Wealth, Power and Resources of the British Empire* (1814); *Commerce and Police of the River Thames* (1800); and *System of Education for the Laboring People* (1806).

COLQUHOUN, SIR PATRICK (MACCHOMBAICH DE), British diplomat and jurist; born April 13, 1815; died May 18, 1891. He was graduated at St. John's College, Cambridge, in 1837, and was called to the bar in 1838. From 1838 until 1864 he was engaged as follows: For the Hanseatic republics, as commercial representative to Greece, Turkey and Persia, from 1838 to 1844; councilor to the King of Saxony in 1857; councilor of the Duke of Oldenburg; in 1858 a member of the supreme judicial council of the Ionian islands, and in 1861 chief justice of that court, holding office until 1864. He was knighted in 1861, and upon his return to England was appointed a member of the Inner Court Temple and one of her Majesty's counsel. He published a number of treatises on various subjects; among them, *The Supreme Court of Judicature Acts of 1873–75* (1875); *Russian Despotism and Ruthlessness* (1877); *A Concise History of the Order of the Temple* (1878); and a *Summary of Roman Civil Law* (1860).

COLQUITT, ALFRED HOLT, a United States Senator from Georgia from 1882 to 1894, was born in Walton County, Georgia, April 20, 1824; died in Washington, District of Columbia, March 26, 1894. He was graduated at Princeton College in 1844; admitted to the bar in Georgia, and began practice at Macon; served in the Mexican War as a major; was elected to Congress as a Democrat in 1852, serving one term; a member of the state legislature in 1859; Presidential elector in 1860 on the Breckenridge ticket. He was a member of the Georgia secession convention, and served on the Confederate side throughout the Civil War, entering as chaplain, but at its close holding the rank of

major-general. He was elected governor of Georgia in 1876, and re-elected in 1880.

COLTON, a town situated in a fruit-raising section of San Bernardino County, southeastern California, 48 miles W. of Los Angeles, on the Southern California and the Southern Pacific railroads. It has canning and packing works and manufactures iron and steel pipes, lime and cement. The town lies at an altitude of about 1,000 feet and has a dry and windy climate. Electric railways connect it with Riverside and San Bernardino. Population, about 2,500.

COLTON, CALVIN, an American clergyman; born in Longmeadow, Massachusetts, in 1789; died March 13, 1857, in Savannah, Georgia. He was graduated at Yale in 1812. He was at first a minister of the Presbyterian Church, but afterward entered the ministry of the Protestant Episcopal Church. He relinquished preaching in 1829 from failure of his voice. From 1831 to 1835 he was in England as correspondent of the New York *Observer*, and on his return to the United States distinguished himself as a writer of political tracts, advocating the principles of the Whig party. He was editor of the *True Whig* in Washington from 1842 to 1844. In 1852 he became professor of political economy in Trinity College, Hartford, Connecticut. Among his many publications on religious, political and other subjects are *History and Character of American Revivals in Religion* (1832); *The Americans, by an American in London* (1833); *Abolition and Colonization Contrasted* (1838); *The Crisis of the Country* (1840); *Life and Times of Henry Clay* (1846); and *The Last Seven Years of the Life of Henry Clay* (1856).

COLTON, WALTER, naval chaplain and author; born May 9, 1797, in Rutland, Vermont; died Jan. 22, 1851, in Philadelphia, Pennsylvania; was graduated in 1822 at Yale College, and in 1825 became a teacher in the Middletown Academy, Connecticut. He next engaged in journalism as editor of the *American Spectator* at Washington, District of Columbia. In 1831 he received an appointment as chaplain in the United States navy. From that time until 1849 he continued in the naval service, visiting the West Indies, the Mediterranean and California, all the while continuing his journalistic work, having editorial connection with the *Colonization Herald* Charlestown, Massachusetts, and the Philadelphia *North American;* and while stationed in California published the *Californian*, at San Francisco, the first newspaper in California. While in California he took an active part in the interests of the community, and was largely instrumental in the establishment of the first schoolhouse. To him belongs the credit of making the first public announcement of the discovery of gold in California, which was made in an open letter to the *North American* in May, 1848. He returned to Philadelphia in 1850. During his voyaging he gathered material for several valuable books of much interest. Among these works may be mentioned *Ship and Shore in the Mediterranean* (1835); *Three Years in California* (1850); and *Deck and Port: Incidents of a Cruise to California* (1850). After his death his *Sea and Sailor, Notes of France and Italy, and Other Literary Remains*, was published by his editor, H. T. Cheever.

COLUBER, a genus of non-poisonous snakes. See SNAKES, Vol. XXII, pp. 192, 194.

COLUMBÆ. See ORNITHOLOGY, Vol. XVIII, p. 46.

COLUMBIA, the capital of Boone County, central Missouri, the terminus of a branch of the Wabash railroad, situated 10 miles N. of the Missouri River, 30 miles N.W. of Jefferson City. It is the seat of the State University, Christian College and Stephens College (Baptist) for women. It has flour and woolen mills, a distillery and tobacco factories. Population 1890, 4,000.

COLUMBIA, a borough of Lancaster County, southeastern Pennsylvania, on the east bank of the Susquehanna River, and on the Columbia branch of the Pennsylvania railroad, 81 miles W. of Philadelphia. It was founded by English Quakers in 1726. A railroad bridge over a mile in length connects Columbia with Wrightsville, on the opposite bank of the Susquehanna. It is a large manufacturing center, having extensive rolling-mills, foundries, oil-refineries, saw-mills, flour-mills, tanneries, gas and water works, and manufactories of steam-engines and railroad iron. Population 1880, 8,312; 1890, 10,598.

COLUMBIA, a city and the capital of the state of South Carolina and Richland County (see COLUMBIA, Vol. VI, p. 168). The city, which has long been famed for its beauty, is built on a plateau about two hundred feet above the Congaree River, affording a magnificent view of the surrounding country. It is about two miles square, regularly laid out, with broad streets, several of them one hundred feet wide, handsomely shaded, with macadamized roadways and paved sidewalks. The state house is built of granite, three stories high, and cost three million dollars. The United States courthouse and post-office, also of granite, and the new city hall are handsome buildings. The South Carolina University, which was organized as a college in 1806, was, in 1880, reorganized, with two branches, the South Carolina Agricultural and Mechanical College at Columbia, for whites, and Claflin University at Orangeburg, for blacks. Other educational institutions are a Presbyterian theological seminary, the Winthrop Normal College, several academies for the education of both sexes, and excellent public schools. The Roman Catholics also have a school, the Ursuline Convent. There is a library containing thirty thousand volumes belonging to the university. There are a number of factories, including a very large cotton factory recently erected, run by water-power. Population 1880, 10,036; 1890, 14,508.

COLUMBIA, the county seat of Maury County, western central Tennessee, on Duck River, on the Louisville and Nashville and Nashville, Chattanooga and St. Louis railroads; by the former, 47 miles S.S.W. of Nashville. The city is the seat of Jackson College, and has two seminaries for young ladies. It has a stock-yard, a grain-elevator and flour and cotton mills. It is the location of a large United States arsenal. Population 1890, 5,370.

COLUMBIA CITY, a city and the capital of

Whitley County, northeastern Indiana, situated on Blue Creek, on the Pittsburg, Fort Wayne and Chicago and the Wabash railroads, 20 miles W. of Fort Wayne. It contains manufactories of flour, lumber and woolen goods. Population 1890, 3,027.

COLUMBIA COLLEGE, a non-sectarian educational institution, located in New York City. It was chartered in 1754 as King's College. As early as 1746, funds had been raised for the establishment of an institution for collegiate instruction. The method employed for procuring this first endowment was the lottery system legalized by act of the legislature. The original sum was added to until in 1851 a nucleus of about $17,000 had been raised. The institution was chartered by George II in October, 1754. The first building was begun on ground donated by Trinity Church in 1756. During the American Revolution the building was used as a hospital, and all work of the college stopped. Classes were resumed in 1784, under the present name, Columbia College. The first location of the college was in what is now the heart of New York City, at

COLUMBIA COLLEGE.

the corner of Barclay and Murray streets. In 1857 the institution was removed to Forty-ninth Street and Fourth Avenue, its present location. The demand for better facilities caused the college authorities to take steps toward securing possession of a tract of 17½ acres lying between One Hundred and Sixteenth and One Hundred and Twentieth streets. The purchase was made in 1892, but the erection of new buildings was not begun until 1895. The college has been especially favored in the way of benefactions. In 1895 the endowment was estimated at over $9,500,000, and the total income, including tuition receipts, $711,079. In 1895 the library consisted of 203,000 volumes, which included all departmental libraries. There are, in addition to the regular collegiate course of instruction, six special schools, all of which go to make up the college. The oldest of these special schools is the School of Medicine, first organized in 1767. From 1813 until 1860 the medical department was permitted to merge with the independent school called the New York College of Physicians and Surgeons. In 1860 this school was reorganized as the Medical Department of Columbia College. The second of the special schools is the Law Department, established in 1858; the third, the School of Mines, was organized in 1863; the fourth, the School of Political Science, in 1880; the fifth, the School of Philosophy, in 1890; and the School of Pure Science in 1892. Under these seven heads courses are given in every branch of collegiate instruction. In 1895 there were 265 in the combined faculties, and 1,943 students were in attendance. From the organization of the institution until 1895, 14,634 have been graduated. The presidents of the college and their terms of office are as follows: Samuel Johnson, 1753–63; Myles Cooper, 1763–75; Benjamin Moore, 1776; no organization, 1776–84; William Moore, 1784–87; W. S. Johnson, son of the first president, 1787–1800; C. H. Wharton, 1800; Benjamin Moore, 1800–11; William Harris, 1811–29; W. A. Duer, 1829–42; N. F. Moore, 1842–49; Charles King, 1849–64; F. A. P. Barnard, 1864–88; Seth Low, 1888.

COLUMBIAN EXPOSITION (1893). See WORLD'S FAIR, in these Supplements.

COLUMBIAN UNIVERSITY, a co-educational institution of learning, located at Washington, District of Columbia, and maintained by the Baptist Church. It was organized in 1821 and incorporated that year by act of Congress. The name, originally Columbian College, was changed to Columbian University in 1873. In addition to the college department, there are the medical, law and dental departments and the Scientific School, the Corcoran School, founded in 1884 by W. W. Corcoran. Post-graduate work in all departments is done. In 1895 there were 142 in the faculty and 1,069 students in attendance. In 1895 the institution had an endowment of over $200,000, with an income of about $70,000, and a library of 11,000 volumes.

COLUMBIAN UNIVERSITY.

COLUMBIA OR OREGON RIVER, the largest American river that enters the Pacific. See OREGON, Vol. XVII, p. 823.

COLUMBINE, the common name of plants of the genus *Aquilegia*, natural order *Ranunculaceæ*, natives of the temperate and colder regions. *A. Canadensis* is a beautiful plant which grows wild in many parts of the United States, but is cultivated with the greatest ease. It has terminal flowers, scarlet without and yellow within, pendulous, and much embellished by the numerous descending yellow stamens and styles. See also HORTICULTURE, Vol. XII, p. 250.

COLUMBIUM. See NIOBIUM, Vol. XVII, p. 513; also CHEMISTRY, Vol. V, pp. 539–541.

COLUMBUS, a city and the capital of Muscogee County, central western Georgia, on the Chattahoochee River, on the Central Railroad of Georgia, the Georgia Midland and Gulf and the Columbus Southern railroads. Columbus is at the head of steam-navigation from the Gulf of Mexico, a distance of three hundred miles. It is connected with Macon, Georgia, by the Southwestern railroad, and is the terminus of the North and South railroad. It is also on the Western and the Mobile and Girard railroads. A change in the level of the Chattahoochee River at this point affords unlimited water-power, which has fostered extensive manufacturing interests. The largest cotton and woolen mills in the South are located at Columbus, producing a great variety of colored goods, ginghams, etc. The city contains an opera-house, superior county buildings, churches, a high school, several graded schools, a female seminary, male academy and several excellent hotels. The streets are broad, handsomely shaded and well-lighted. Population 1880, 10,123; 1890, 17,303. See COLUMBUS, Vol. VI, p. 171.

COLUMBUS, capital of Bartholomew County, southern central Indiana, situated 41 miles S.E. of Indianapolis, on the E. fork of White River, on the Cleveland, Cincinnati, Chicago and St. Louis and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. It has large cerealine and flour mills and furniture and agricultural implement factories. Population 1890, 6,719.

COLUMBUS, a railroad junction and the capital of Cherokee County, southeastern Kansas; situated 50 miles S. of Fort Scott. It is on the Kansas City and Memphis and the St. Louis and San Francisco railroads. Coal and zinc are mined in the neighborhood. Population 1895, 2,204.

COLUMBUS, a village of Hickman County, southwestern Kentucky; situated on the Mississippi River, 12 miles below Cairo; on the Mobile and Ohio railroad. It is an important center of trade and transportation, and contains manufactories of furniture and crockery. Population 1890, 873.

COLUMBUS, the capital of Lowndes County, northeastern Mississippi, on the Tombigbee River, on the Mobile and Ohio and the Southern railroads. It has the State Industrial Institute and a college of science and industry for girls. It is in the center of the coal and iron mining region, has a number of machine-shops and factories and a large cotton-mill. Population, 4,559.

COLUMBUS, the capital of Platte County, eastern central Nebraska, on the Union Pacific and the Burlington and Missouri railroads, and on the Platte River, 92 miles W. of Omaha. The city has a Roman Catholic academy and various manufactories. Population 1890, 3,134.

COLUMBUS, a city and the capital of the state of Ohio, is reached by no less than 15 different lines of railway, and has 30 miles of street-railways, operated by both horse and electric power. There is an abundant supply of natural gas, which is used largely by manufacturers, as well as by private families, for fuel. Carriage-manufacturing is the leading industry, one company manufacturing two million dollars' worth of goods annually. The area of the city is twelve square miles. Public parks cover 195 acres. The State University, United States Garrison, State Fair, Capitol and other grounds—all fine parks—have a total area of 600 acres. A United States custom-house was established in Columbus in 1889, which transacted about one million dollars' worth of business in 1890. Population 1880, 51,647; 1890, 90,398. See COLUMBUS, Vol. VI, p. 170.

COLUMBUS, the capital of Colorado County, southeastern Texas, situated on the Colorado River and on the Southern Pacific railroad. Colorado College is located here. Cotton is the chief industry. Population, 2,199.

COLUMBUS, BARTOLOMEO, elder brother of Christopher Columbus, was born about 1445, probably in Genoa, Italy; died in the city of Santo Domingo, West Indies, in May, 1515. The early part of his career is unknown. The first mention of him is that he was with Bartolomeo Diaz in a voyage of exploration along the west coast of Africa as far south as the Cape of Good Hope. He was sent by his brother to England in 1488 to interest Henry VII in the plan of a western voyage. He was unsuccessful in his mission, but did not return to Spain until Christopher had made his first voyage of discovery, returned to Spain and set sail on his second voyage. Bartolomeo was placed in command of a fleet, and sailed at once for the West Indies, arriving there in June, 1493. He was made lieutenant-governor of Hispaniola by his brother, and shared with him the trials and imprisonment afterward inflicted. Later, however, Bartolomeo was rewarded, with Diego Columbus, son of Christopher, and was made governor of Mona. He was the founder of the colony of Santo Domingo and of the town where he died.

COLUMELLA, the axis to which the carpels of a compound pistil often are attached (see BOTANY, Vol. IV, p. 149), and the central axis of spiral univalve shells. See CORALS, Vol. VI, p. 375.

COLUSA, a town and the capital of Colusa County, northern California, on the Sacramento River, 65 miles N.N.W. of Sacramento, on the Colusa and Lake railroad. It has flouring-mills and manufactories of carriages and farming tools. Population 1890, 1,336.

SIDNEY COLVIN.

COLVIN, SIDNEY, British historical writer and keeper of the department of prints and drawings in the British Museum; born June 18, 1845, in Norwood, Surrey, England. He was graduated from Trinity College, Cambridge, in 1867. He was fellow of Trinity College in 1869; from 1873 to 1886, Slade professor of fine arts; from 1876 to 1884, director of the Fitzwilliam Museum, Cambridge. Since his graduation he has been a frequent contributor on historical subjects to the

leading magazines. He published an edition of *Selections from the Writings of Walter Savage Landor* (1884); and is the author of *Monographs on Keats and Landor*, in the English Men of Letters Series (1882). He edited for his lifelong friend R. Louis Stevenson the unfinished posthumously published story *Weir of Hermiston* (1896).

COLWELL, STEPHEN, an American author; born in Brooke County, Virginia, March 25, 1800; died in Philadelphia, Pennsylvania, Jan. 15, 1872. He was admitted to the bar in 1821 and practiced in Pittsburg, Pennsylvania, for ten years. Subsequently he wrote for the press on his favorite topics of political and social science. During the Civil War he was one of the foremost supporters of the national government in its struggle against secession, lending his time and money to the cause. After the war he was made a commissioner to examine the internal revenue system of the United States, and to this task he devoted much time and study. He bequeathed his library to the University of Pennsylvania and endowed a chair of social science there. Among his numerous writings on politico-social and religious topics are *Politics for American Christians* (1852); *Hints to Laymen* (1853); *The South* (1886); *The Ways and Means of Commercial Payment* (1858).

COLYMBIDÆ, a family of web-footed birds. See DIVER, Vol. VII, p. 292.

COMA BERENICES, a small and close cluster of stars near the equinoctial colure, south of the tail of the Great Bear, visible in April and May, near the zenith. It is one of the nine constellations introduced by Hevelius. According to Egyptian legends, Coma Berenices, the English rendering of which is Berenice's Hair, was the name given to this constellation, owing to the belief that the hair of Berenice, a wife of Ptolemy Euergetes, king of Egypt in 248 B.C., which had been given into the care of the priests of the temple of Venus at Samos and disappeared, had been placed by the gods in the tail of Leo in the form of this constellation.

COMAN, KATHERINE, an American educator; born in Newark, Ohio, in 1857; educated in the University of Michigan; in 1886 was appointed professor of history and economics in Wellesley College. Among her works are *Outlines of English Constitutional History* (1886) and *Outlines of Industrial History* (1892).

COMANCHE, a town and the capital of Comanche County, northern central Texas, on the Fort Worth and Rio Grande railroad, 90 miles S.W. of Fort Worth. Its principal industries are stock-raising and farming. Population 1890, 1,226.

COMETS. See ASTRONOMY, Vol. II, pp. 813–6; and ASTRONOMY, in these Supplements.

COMET-SEEKER or COMET-FINDER, a telescope with a low magnifying power, and a short focus as compared with the size of its object-glass. It has a wide field, and is employed to find comets.

COMFORT, GEORGE FISK, an American educator; born in Berkshire, Tompkins County, New York, in 1833. He graduated at Wesleyan University, and then studied in Europe. On his return to the United States in 1865, he was made professor of languages at Allegheny College, Meadville, Pennsylvania, and in 1872 became professor of æsthetics and modern languages at Syracuse University, Syracuse, New York. Among his publications is a series of text-books on the German language.

COMFREY, the common name of species of *Symphytum*, a genus of *Boraginaceæ* (or *Asperifoliaceæ*), and natives of the Old World. They are coarse, branching and leafy herbs, with tubular-funnel-form flowers, nodding in raceme-like or forked clusters. *S. officinale*, the common comfrey, with yellowish-white flowers, is naturalized in the United States. *S. asperrimum*, with reddish-purple flowers changing to blue, is cultivated somewhat. The root of various species, notably *S. officinale*, is used in a medicinal way, and formerly was cultivated widely in Europe for this purpose.

COMISO, a town of southern Sicily, in the province of Noto, 30 miles W. of Syracuse. It has paper manufactories. Population, 18,167.

COMMANDER OR KOMMANDORSKI ISLANDS, two Russian islands of the east coast of Kamchatka, eastern Siberia. They are a continuation of the Aleutian chain, at lat. 55° N., long. 167° E. They were named in honor of Bering, who was known as the commander in those regions, and the western one bears his name. This is 50 miles in length and 17 in width at the broadest part. The other, Copper Island, is 30 miles long and less than five miles wide. Some copper is found here. The climate, for the latitude, is mild. The country is mountainous, but without vegetation, and earthquakes are frequent.

COMMANDITE, SOCIÉTÉ EN, or partnership in, an expression used in France to express a partnership in which one may advance capital without taking charge of the business. In other words, it is similar in nature to the "special partnership" recognized by the statutes of several states in the Union.

COMMENTRY, a town in the French department of Allier, 211 miles S. of Paris by rail. It is near a great coal-field, and owes its rise to coal and iron works. It has also celebrated mirror factories. Population, 9,978.

COMMERCIAL AGENCIES. See MERCANTILE AGENCIES, in these Supplements.

COMMERCIAL LAW is a term denoting those branches of law which prescribe the rights of property, and the rules governing the business relations of persons engaged in commerce or trade. The rules of commercial law are more nearly the same throughout the world than any other branch of municipal law, for the reason that the commercial relations between the various countries of the world tend to bring about a similarity in the rules of law governing trade and commerce.

COMMERCIAL MUSEUM OF PHILADELPHIA, a department of the Philadelphia, Pennsylvania, museums, established by special ordinance of the city councils, June 15, 1894. The project had its inception at the World's Columbian Exposition, when, at the instance of public-spirited citizens of the Quaker City, the most important parts of the exhibits at Chicago, from Mexico, Central and South America, Australia, South Africa and many Asiatic countries, were, at the close of the Exposition,

removed to Philadelphia to form the nucleus of the museum. The products of other countries were obtained and added to the collection. Consisting, as the museum does, of collections of natural products from all the countries of the world which have entered the American markets, or which may be made available for them, its objects are: To bring before the American manufacturers, dealers and consumers all the varied products of the world, so that the American consumer, dealer or manufacturer can make the best selection for his special interest; to publish scientific and useful information concerning such products, and periodically to exhibit fresh manufactures and samples of goods likely to be of service in American markets. At present the museum occupies temporarily, with others of the city museums, the former offices of the Pennsylvania Railroad Company, on South Fourth Street, embracing a floor-area and exhibition space of 200,000 square feet. A central location of 16 acres has been apportioned as the future site of the museums, and $15,000 has been appropriated to preparing the ground for building. In 1896 the city also appropriated $65,000 for general museum expenses and for the work of the bureau of information. The museum is under the control of a board of trustees elected by the councils and approved by the mayor. Of these, 14 are elected for life, so as to insure a permanent policy, and the leading state and city officials for the time being are *ex officio* governors. The exhibit of raw products numbered over sixty thousand specimens in 1896, and collectors for the museum have been sent abroad to secure further and more recent material. A bureau of information affords specific information to manufacturers on any desired subject within the scope of the museum's work.

COMMERSON, PHILIBERT, a French botanist; born at Châtillon-les-Dombes, Nov. 18, 1727. When Bougainville sailed in 1767 on his expedition to South America and Madagascar, Commerson was chosen as the naturalist of the party. He was chosen a member of the French Academy in 1733, and died in the same year. The genus *Commersonia*, of the family *Sterculiaceæ*, was named in his honor.

COMMINATION, a penitential office used in the Church of England after the Litany on Ash Wednesday, consisting of sentences taken from Deuteronomy xxvii and other passages of Scripture. To each sentence that is read the congregation responds "Amen." This office has never been incorporated in the American prayer-book.

COMMISSION, a writing, generally in the form of a warrant, authorizing one or more persons to perform duties or exercise powers belonging to another or to others. Instruments of delegation bearing this title are issued by the government to officers in the army and navy, judges, justices of the peace, postmasters and others. Another class of commissions are those granted to a body of persons intrusted with the performance of certain special duties of a public or legal character.

COMMISSIONNAIRES, a class of guides and attendants in continental Europe, who perform certain miscellaneous services and attend at the arrival of railway trains and steamboats to secure customers, look after baggage, etc. To travelers with limited time at their disposal they are valuable as guides. A corps of uniformed commissionnaires has been established in England, consisting of maimed soldiers of high character who have retired with a pension. These act as messengers, door-keepers, etc.

COMMODORE. See NAVY, in these Supplements.

COMMON CARRIER. See CARRIER. Vol. V, p. 138.

COMMON SCHOOLS OF THE UNITED STATES. See SCHOOL, COMMON, in these Supplements.

COMMUNICATION, PRIVILEGED, a communication between such persons or under such circumstances that it does not involve an action for damages, or a communication between such persons and under such circumstances that the receiver cannot be called upon to produce it, as an admission in a suit. The most common instance of such privilege is in the case of a client and his legal adviser. In the United States members of the legal profession are privileged, and, as a rule, what a client communicates to them cannot be disclosed except the right of confidentiality be waived. The privilege is extended to the communications of several parties, or of their counsel and agents engaged on the same side of a cause, and made with a view to their joint prosecution or defense. Interpreters stand in the same relation as attorneys.

Confessions made to a clergyman or priest in some states are privileged by statute, but generally it is otherwise. By a statute of the state of New York, ministers of the Gospel and priests of every denomination are forbidden to disclose confessions made to them in their professional character, and in the course of discipline enjoined by the church. Similar statutes exist in Missouri, Wisconsin, Michigan and Iowa. Communications made to a physician are in some states privileged, and in others not. Communications between husband and wife are privileged from disclosure.

In England no special privilege is extended to the Roman Catholic confessional, and the question as to how far a confession made to a clergyman for the purpose of obtaining spiritual comfort and consolation is protected, was long considered doubtful. The rule has, however, been established for some time that clergymen are not entitled to the same privilege as legal advisers; in Scotland the point has never been decided. In England communications to a medical man, even in the strictest professional confidence, are not protected from disclosure; and the same is the case in Scotland. For communications involving no liability for defamation, see LIBEL, Vol. XIV, p. 506.

COMMUTATOR, a recent improved form of commutator is found in the Western electric iron-clad arc dynamo. It is built up on a substantial disk of hardwood veneering mounted on a brass flange. The wooden disk is faced with mica, and each segment screwed in independently. These segments are tapered slightly toward the inner side, to allow slate wedges to protect the mica and veneer-

ing. Air-insulation is provided for between the segments, thus confining any flashing almost wholly to the brushes. All the screws are accessible from the front, for convenience in making repairs. The segments are increased in size at the working part so as to provide for long life, and also to hold the flashing as much as possible in the working parts of the segments. In some dynamos the commutators are now made of greatly increased diameter, so as to allow of more commutator-bars, and a consequent increase in the number of alternations in the current.

C. H. Cochrane.

COMNENUS, the name of a family, originally Italian, of which many members occupied the throne of the Byzantine empire from 1057 to 1204, and that of Trebizond from 1204 to 1461. For biographical particulars as to them, see Alexius I, Vol. I, p. 501; Andronicus I, Vol. II, p. 22; Anna Comnena, Vol. II, p. 59; Isaac I, Vol. XIII, p. 374; John II, Vol. XIII, p. 713; and Manuel I, Vol. XV, p. 505.

COMO, a town of Park County, central Colorado, and an important junction of the Denver, Leadville and Gunnison railroad; situated at the head of Kenosha Pass. It is surrounded by extensive coal-mines. Population 1890, 374.

COMODO, an island of the Malayan Archipelago, in lat. 8° 30′ S., long. 120° E. It is 35 miles in length and 16 miles in width, and occupies nearly the entire width of the strait which separates the islands of Sambawa on the west and Flores on the east.

COMORIN, Cape, the most southerly extremity of India, in lat. 8° 4′ 20″ N., and long. 77° 35′ 35″ E.

COMPARETTI, Domenico, philologist; born June 27, 1835, at Rome. In 1859 he was appointed to the chair of Greek in the University of Pisa, which he exchanged a few years later for the same position in the Instituto di Studii Superiori at Florence. He was a frequent contributor to the learned journals, and author of works on Greek dialects in south Italy; *Virgil the Magician*, and *Homer and Pisistratus*. With D'Ancona he edited the invaluable *Canti e Racconti del Popolo Italiano* (1875).

COMPASS PLANTS, a name that has been applied to those plants, the "fixed light position" of whose leaves is vertical and directed north and south. As a consequence, the leaves stand edgewise and twist into the meridian plane. The purpose is to expose the broad leaf-surfaces to the incident rays of light during the morning and evening, and to protect them from the too intense light and heat of the mid-day rays. The best-known "compass plants" are *Silphium laciniatum*, a "rosin-weed" of the prairies of the United States, and *Lactuca Scariola* of Europe, but extensively naturalized in the United States. Both of these plants belong to the great family of *Compositæ*, and both strikingly exhibit the phenomenon referred to. When grown in shaded or otherwise protected places the phenomenon does not appear, and the use of these plants as "compasses" in very cloudy weather is a doubtful story.

COMPETITION. See Political Economy, Vol. XIX, p. 381; Wages, Vol. XXIV, p. 309.

COMPLAINT, in criminal law, is the formal charge, made in writing, and usually under oath, before some magistrate or other proper tribunal, alleging that some person has been guilty of a designated offense, which the party making the charge offers to prove. The person making the charge is called the complainant. Complaint is also a term used in connection with civil actions, especially in states which have adopted a code of procedure, and when so used refers to the first pleading filed by the plaintiff, setting forth his cause of action in detail. In this sense it has the same meaning as declaration.

COMPLEMENTARY COLORS. A term used in art to describe colors, the combination of which produces white light. According to the laws of physics, the complementary color to green is red, that to blue is orange, that to purple is yellow, and *vice versa*. In practice, the combination of complementary colors does not produce pure white at all, but gray.

COMPLINE, the last office of the canonical hours of the Roman Catholic Church, sung immediately before retiring for the night. See Breviary, Vol. IV, p. 263; Canonical, Vol. V, p. 22.

COMPLUTENSIAN POLYGLOTT. See Jimenes, Vol. XIII, p. 694; Polyglott, Vol. XIX, p. 417.

COMPOSITÆ, by far the largest family of flowering plants, containing ten to twelve thousand species distributed throughout the world. Those of temperate regions are chiefly herbs, although many of them are shrubby in the arid regions of the western United States, notably the "sage brushes," while many tree-forms occur in the tropics. It is regarded not only as the most numerous, but also the most highly organized family of flowering plants. It is characterized by its small flowers being collected in dense heads surrounded by involucral bracts, thus giving the appearance of a single flower, which was formerly called a "compound flower." The calyx is modified into the characteristic "pappus" of the group, which appears as a tuft of hairs, or bristles, or scales of various kinds. The corolla is gamopetalous, either tubular throughout or becoming flat (like a strap) above. The strap-shaped corollas, in many cases, are found only at the margin of the head, and as they are usually relatively large and brightly colored, they still further increase the resemblance to a single flower by simulating a set of separate petals. In such cases as the dandelion all the flowers are strap-shaped. Notable members of the family are asters, goldenrods, sunflowers, thistles, arnicas, etc. Many species are cultivated for their beauty; many yield valuable products useful in the arts, in medicine, etc. Among the common food-producing species are lettuce, artichoke, salsify, chicory, etc.

COMPOSITION, in bankruptcy, is an agreement between a debtor and creditor, whereby the creditor accepts a part of his demand in discharge of the entire debt, upon terms or by means different than are provided in the original contract or required by

law. Such agreements are frequently made in other forms of insolvency proceedings; also, especially where the debtor, in consideration of the discharge, is able to borrow sufficient money from friends to pay a larger portion of his debts than could be realized by the sale of his assets through the usual course of administration. A composition agreement is generally in writing, and if made in good faith, will be valid.

COMPOSITION OF FORCES. See MECHANICS, Vol. XV, p. 701.

COMPOSTS. See HORTICULTURE, Vol. XII, p. 232, and MANURE, Vol. XV, p. 505.

COMPOUND ANIMALS. See COLONIAL ANIMALS, in these Supplements.

COMPOUNDING A FELONY, the act of the party against whom an offense has been committed, who agrees with the felon that he will not prosecute him, upon condition that the thief returns the stolen goods, or who in any manner accepts reward or other consideration for not prosecuting the offender. This offense was, at common law, punishable in the same manner as the felony compounded. Throughout the United States the offense is indictable, and the punishment fixed by statute, but is now usually punishable only as a misdemeanor. Any note, receipt or other contract given upon such consideration, in whole or in part, is void in law. The failure to prosecute does not constitute the offense, unless accompanied with the acceptance of some consideration, therefor. Compounding a misdemeanor is also indictable, but if the offense be such that an action for damages will lie against the offender at the suit of the party injured, the law will generally permit a compromise, even though a criminal prosecution could have been maintained. Advertising a reward for the return of stolen property, with an offer not to prosecute, is a similar offense to compounding the theft.

COMPRESSED AIR. See AIR-COMPRESSORS AND USES OF, in these Supplements.

COMPRESSED-AIR MOTORS. See MOTORS, in these Supplements.

COMPTON, BARNES, an American public man; born in Port Tobasco, Maryland, Nov. 16, 1830. He graduated at Princeton in 1851. He was elected a member of the state house of delegates from Charles County in 1860 and 1861, and of the state senate in 1867, 1868, 1870 and 1872, serving as its president in 1868 and 1870. Was elected state treasurer of Maryland six times, holding the office eleven years and two months, when he resigned. In politics he was a Democrat, and was elected a representative from the fifth Congressional district of Maryland to the Forty-ninth and Fiftieth Congresses. He was declared re-elected to the Fifty-first Congress, but was unseated by the House of Representatives. He was elected to the Fifty-second and Fifty-third Congresses from the same district. Died in Laurel, Md., Dec. 2, 1898.

COMPTROLLER OR CONTROLLER, an officer of a country, state, municipality or corporation whose duties are specially connected with fiscal affairs, as to examine, certify, audit, or in other ways superintend accounts. The United States has three comptrollers: A first comptroller of the Treasury, who examines and revises certain civil accounts; a second comptroller of the Treasury, who performs similar duties with the accounts of the War and Navy departments; and the comptroller of the currency, who administers the laws relating to the national banks.

COMPULSORY EDUCATION. See SCHOOLS, PRIVATE, in these Supplements.

COMPURGATORS, twelve persons whom Anglo-Saxon law permitted the accused to call in proof of his innocence, and who joined their oaths to his. They were persons taken from the neighborhood, or otherwise known to the accused. It was rather in the capacity of witnesses to good character, than of jurymen, that they acted, though the institution has been spoken of as the Anglo-Saxon jury; what they swore to was not so much their knowledge as their belief. See JURY, Vol. XIII, p. 784.

COMSTOCK, ANTHONY, an American moral reformer; born at New Canaan, Connecticut, March 7, 1844; served in the Union army, 1863–65. In March, 1873, he was appointed a post-office inspector in New York, becoming at the same time secretary and chief special agent of the New York Society for the Suppression of Vice. His activity in destroying obscene literature has been remarkable. Several works, as *Traps for the Young* (1883), *Morals versus Art* (1887), and other similar books, came from his pen, as well as contributions to the periodical press.

COMSTOCK, CYRUS BALLOU, an American military engineer; born in Massachusetts, Feb. 3, 1831; graduated at West Point in the class of 1855. After some service in constructing fortifications, and as an assistant professor at West Point, he was called to Washington in 1861, to assist in erecting defenses against the threatened rebel attack. He was prominent as an engineer-officer in many of the principal battles of the war, repeatedly earning promotion and the commendations of his superiors. At the close of the war, Colonel Comstock held the rank of a brevet brigadier-general in the army and brevet major-general of United States volunteers. He was successively superintendent of the Lake Geodetic Survey; president of the Mississippi River Commission; member of the Board for Fortifications and Harbor Improvement; and colonel commanding the United States corps of engineers. In 1884 he was a member of the board of visitors of the Engineer School, and in the following year was elected a member of the National Academy of Sciences.

COMSTOCK, JOHN HENRY, an American entomologist; born at Janesville, Wisconsin, Feb. 24, 1849, and educated at Cornell University, where he was instructor in entomology, assistant professor, and professor of entomology and general invertebrate zoölogy. From 1879 to 1881 he was United States entomologist, and issued two official reports, in addition to a report on the cotton insects. His *Monograph of the Diaspinæ* (1883) and *Introduction to Entomology* (1888) are standard contributions to entomological literature.

COMSTOCK, John Lee, an American writer on physics; born at East Lyme, Connecticut, in 1789; served as army surgeon in the war of 1812. His *Natural Philosophy* is said to have reached the enormous sale of a million copies. Among many other works he wrote a *History of the Greek Revolution* (1829). He died at Hartford, Connecticut, Nov. 21, 1858.

COMSTOCK LODE. See Nevada, Vol. XVII, p. 368; Mining, Vol. XVI, p. 470; and also Silver and Silver Mining, in these Supplements.

COMZA RIVER. See Africa, in these Supplements.

CONANT, Thomas Jefferson, Biblical scholar; born in Brandon, Vt., Dec. 13, 1802. In 1825 he became tutor in Columbian College, Washington, District of Columbia, and, in 1827, professor of Greek, Latin and German in Waterville College, Maine. In 1835 he became professor of languages and Biblical literature in Madison University, at Hamilton, New York, and held this position till 1851, when he accepted the chair of Hebrew and Biblical exegesis in Rochester Theological Seminary. He resigned in 1857 to accept, from the American Bible Union, the office of reviser of the common English version of the Bible, continuing in this service till 1875. He was conceded to be one of the first Hebraists of the age, and wrote many works on Biblical subjects. He died in Brooklyn, New York, April 30, 1891.

CONCENTAYNA, a town of Valencia, southeastern Spain, situated on the southern slope of the Sierra Mariola. It has manufactories of linen, woolen, paper, soap, etc. Population, 7,756.

CONCENTRATION OF ORE. See Silver and Silver-Mining, in these Supplements.

CONCEPCION DEL URUGUAY or URUGUAY, a city of eastern Argentina, a terminus of the Entre Rios railroad, on the Uruguay River, 160 miles N. of Buenos Ayres. It is in a grazing district, and has an extensive trade in cattle and salted meat. It was formerly the capital of Entre Rios province. The deserted castle and great estates of General Urquaza are near by. Population 1890, about 10,000.

CONCEPTION, Nature of Mental. See Psychology, Vol. XX, pp. 57, 76.

CONCEPTUALISM. See Scholasticism, Vol. XXI, p. 424.

CONCERTINA, a portable musical instrument of the seraphine family, patented by the late Sir Charles Wheatstone, June 19, 1829. It is hexagonal, and has a keyboard at each end, with expansible bellows between the two. The sound is produced by the pressure of air from the bellows on free metallic reeds. The compass of the treble concertina is four octaves, through which it has a complete chromatic scale. The instrument is double-action, and produces the same note both on drawing and pressing the bellows. Much variety of tone can be obtained by a skillful player, and it has the power of being played with great expression and complete *sostenuto* and *staccato*. Violin, flute, and oboe music can be performed on it without alteration, but music written specially for the concertina cannot be played on any other instrument, except the organ or harmonium. There are also tenor, bass, and double-bass concertinas, single-action, and varying in size and shape. Much brilliant *salon* music has been written for the concertina.

CONCERTO, an instrumental composition, which is designed to show the skill of an executant, and which almost invariably is accompanied by orchestra, one exception being Liszt's *Concert Pathétique* for two pianos, and another, Schumann's Sonata, opus 14, originally published as *Concert sans Orchestre*. The word at one time was used differently. It was employed first by Ludovico Viadana, who, in 1602–03, published a series of motets for voices and organ, which he entitled *Concerti Ecclesiastici*. The real inventor of the modern concerts as a concert piece was Giuseppe Torelli, who, in 1686, published a *Concerto da Camera* for two violins and bass. The modern form of the concerto was finally settled by Mozart.

CONCH, a marine shell, especially of the *Strombus* and *Triton*. Large quantities of the shells are exported from the Bahamas to be used in cutting shell-cameos. The natives of the islands use the contents of the shell as food.

CONCHIFERA, in Lamarck's arrangement of mollusks, a class containing those which have bivalve shells (*Lamellibranchiata*). See Mollusca, Vol. XVI, p. 684.

CONCHOID OF NICOMEDES, a curve of the fourth degree, invented by Nicomedes, about the second century before Christ, with the view of trisecting an angle, of constructing two geometrical means between two given straight lines, and of finding a cube double a given cube. The curve is sometimes used in architecture as a bounding line of the meridian section of columns.

CONCHOLOGY, that branch of natural history which deals with the shells of mollusks. From the time of Aristotle the beauty and variety of these structures have made them favorite objects of study, and few zoölogical subjects have excited so much popular enthusiasm. The study often became unscientific, and sometimes a craze. Since the shells are only external coverings, and seldom were considered in relation to their tenants, or in connection with the internal and external influences to which they owe their shapes, conchology has been somewhat barren of scientific results.

CONCINI, Concino, Marquis d'Ancre, Baron de Lusigny, a Florentine adventurer; born in Florence, and accompanied Maria de Medici (queen of Henry IV of France) when she went to Paris in 1600. He married Eleonora Galigai, a favorite attendant of the queen. Concini made his mark by his talents for intrigue, and on Maria becoming regent in 1610, his fortune was assured. In 1613 he was appointed a marshal of France and prime minister. His rapacity having provoked general and widespread hatred, he was assassinated near Paris, April 24, 1617.

CONCLAVE, the secret meeting of the college

of cardinals for the purpose of electing a pope. (See also CONCLAVE, Vol. VI, p. 239.) The Saviour himself, according to Catholics, selected the first pope, St. Peter, but nowhere in Scripture or tradition can any law be found by which he determines by whom, or in what manner, the succeeding pontiffs are to be chosen. Hence, from time to time, the church has enacted laws on this matter, which, also, have been changed whenever necessity required it. Whether the pope can choose his own successor is a controverted and difficult question among canonists. While all admit that the pope has the power of determining by whom and in what way his successors shall be chosen, nevertheless they hold diametrically opposite views as to whether he can select his own successor. Pope Boniface II, in 529, actually appointed his successor, but the next year he annulled his decree. On the other hand, Pope Celestine III wished to resign the papacy in favor of Cardinal John de St. Paul, but because such an action was unknown in the church he determined not to do it. Under Pope Paul IV the question was discussed in consistory, and he, with a majority of the cardinals, thought the affirmative opinion should be rejected as false, but no decree was issued on the subject.

The method of selecting the pope has been different in different ages. In the beginning of the church the election pertained to the priests and deacons of the city of Rome. But from the time of St. Sylvester, when the Christian religion began to be professed publicly, the whole Roman people had a certain part in his election, by bearing testimony to his life and character. Throughout the first four centuries, while the pope was selected in this way, the greatest liberty prevailed. But from the fifth to the eleventh century, emperors and kings usurped great authority in the matter, so much so that at times the election ruled by them was clearly injurious and invalid, and was declared so by those who had the right of suffrage. To preclude such injurious interference on the part of temporal authority, in the year 1059 Pope Nicholas II prescribed a certain form and method for filling the Roman see, which was published in the Lateran Council, and by which the cardinal bishops (see CARDINAL, in these Supplements) were declared the electors of the sovereign pontiff, while to the other cardinals, the clergy and the Roman people it was left only to consent to the election made by these cardinals. In the year 1178, in another Lateran Council, Pope Alexander III decreed that the election of the sovereign pontiff should pertain to all the cardinals, but to them alone, and that he who received two thirds of the votes of all the cardinals participating in the election should be the pope.

A vacancy occurs in the Apostolic See when the pope resigns or dies. Notice of the vacancy is sent to all cardinals, and without being summoned, but guided only by the law, after the funeral services of the deceased pope, on the morning of the eleventh day after his death, they enter the conclave under the presidency of the cardinal dean. The conclave must be held in the city where the pope dies, unless by special decree to the contrary. The windows in that section of the palace or building devoted to the conclave are walled up, and also all doors except one, which is doubly locked, one key being kept by the cardinal camerlengo, the other by the governor of the conclave. Food is introduced through a turning box, which is also doubly locked. There is, however, a small opening or window through which audience may be given to the ambassadors of those nations which claim the privilege of each excluding one objectionable candidate. A strict watch is kept by prelates assigned for that purpose, so that no letter or message may be transmitted to or from the conclave, and severe punishment follows an offense in this matter. Inside the conclave, and subject to its restrictions, each cardinal is allowed to bring two servants, who must have been in his employ for at least a year, and must be real servants, not brothers or nephews, of the cardinal. Besides these, there are several officials, such as the sacristan, masters of ceremonies, physicians, barbers, a carpenter, a mason, and some servants for general work. During the balloting every one is excluded from the chapel, except the cardinals.

The election of a pope may be accomplished in three ways: By quasi inspiration, when all the cardinals unanimously and at once agree on the same person, without there having been any previous deliberation on the subject; by compromise, when the cardinals commit the right of choosing the pope to a few specified persons; or by ballot.

The governments of Austria, France and Spain claim the privilege of each excluding one candidate who is objectionable. Whence this privilege originated, or at what time, is unknown, but a diligent examination fails to reveal any trace of it in canon law or in any concordat granted by the Holy See. Many writers claim it is wholly a usurpation. However, it has been exercised even in the present century, and though Pius IX, in three bulls, published in 1871, 1872 and 1873, entirely abolished all rights or privileges of exclusion, still, in the conclave which elected his successor, Cardinal Bonnechose, in the name of France, opposed Cardinal Bilio after the first ballot. Cardinal Pecci, who took the name of Leo XIII, was elected then. Because of the loss of the Papal States, and the possible interference of secular governments, Pope Leo XIII issued several regulations for future conclaves, specifically denying all privileges assumed by these governments in the past in regard to conclaves.

If no choice is made the first day, two sessions are held each day until a pope has been elected canonically. Meanwhile, in all the churches of Rome and the world, special prayers are offered. As soon as the tellers find that some candidate has received two thirds of the votes, his name is declared. If the newly elected pope is present, the cardinal dean asks him whether he consents, and if so, what name he intends to take. Then

he is placed before the altar, where he receives the salutation of all the cardinals. The camerlengo then places the fisherman's ring on his finger. In the mean time the senior cardinal deacon goes to the balcony over the entrance to the palace, and announces to the people the election of the new pontiff. The castle of San Angelo then fires its guns, and the bells of the city churches are rung, in salute. Ordinarily, the pope immediately goes to St. Peter's Church, where the *Te Deum* is sung in thanksgiving.

P. A. Baart.

CONCOMITANCE, Sacramental, is the doctrine of the Roman Catholic Church, as established by the Council of Trent, that the body and blood of Christ are given both under the form of bread and under that of wine; hence that he is received whole and entire when taken under the form of bread alone or wine alone. Since the Council of Constance, the principle has been fixed in that church that Christ was given whole and entire under either species. The Protestant Church maintains that the officiating priest receives both body and blood twice, and that it holds equally good for one kind in the sacrifice of the mass.

CONCONULLY, a village and the capital of Okanogan County, central northern Washington, on the Conconully Creek, 18 miles above the Okanogan River. It is in a rich mining district, where gold, silver and lead are found. Population 1890, 232.

CONCORD, a town of Middlesex County, eastern Massachusetts, on the Concord River, and on the Fitchburg railroad. (See Concord, Vol. VI, p. 240; and United States, Vol. XXIII, p. 739.) It was the home of Alcott, Emerson, Hawthorne, Thoreau and other persons of literary eminence. It has a good public library and has manufacturing industries. The state prison is located here. Population 1895, 5,175.

CONCORD, a city and the capital of Merrimack County, central southern New Hampshire, and capital of the state, on the Boston and Maine railroad. The Merrimack River divides the city into two portions, which are connected by seven bridges, three of them railroad bridges. The streets are wide, well paved and lighted. The chief educational institutions are St. Paul's (Episcopal) School, a public high school, and several graded schools. It has also a public library, and a state library containing 11,000 volumes. Its principal public buildings are the state house, built of granite, city hall, state prison, two orphanages, a home for the aged, and a state insane asylum. Concord has many fine hotels and extensive manufacturing interests, but chiefly is noted for its valuable granite-quarries. Population 1880, 13,843; 1890, 17,004. See Concord, Vol. VI, p. 240.

CONCORD, the capital of Cabarrus County, southwestern North Carolina, on the Southern railroad, 21 miles N.E. of Charlotte. It has academies for boys, and Scotia Seminary for colored girls, a cotton factory, machine-shops and iron-works. Population 1890, 4,339.

CONCORDIA, a town of the Argentine state of Entre Rios, on the Uruguay, 302 miles N. of Buenos Ayres by river, on the Argentine Republic railroad. It has a custom-house, and a river trade exceeded only by that of Buenos Ayres and Rosario. Population, 5,498.

CONCORDIA, a railway city and the capital of Cloud County, central northern Kansas. The Missouri Pacific, the Atchison, Topeka and Santa Fé, the Burlington and Missouri River and the Union Pacific railroads all meet here. It is on the Republican River and has ample water-power, which is applied in various factories or mills, where flour, wagons and farm implements are made. There are several schools and seminaries in the city, and also a United States land-office. Population 1895, 3,011.

CONCUSSION of the Brain. See Insanity, Vol. XIII, pp. 100–108.

CONDENSED MILK consists of cow's or goat's milk which has been evaporated in vacuum pans to about one fourth of its volume, and sugar added to the amount of about one and one quarter pounds to the quart of condensed milk produced. It is also prepared without sugar, but the unsweetened article requires refrigeration, to be kept for any considerable length of time. But little change has been made in the methods of condensing milk since the process was first patented and perfected, but the consumption of the article has increased to such an extent that it is estimated that in 1896 fully 500,000,000 gallons of milk were used by the condensing companies now doing business in the United States. The best condensed milk will keep for an indefinite time, stand changes of temperature and climate, and, being ready for instant use by the addition of amounts of water varying with the purposes for which it is intended, it has become one of the staple articles of commerce. See Milk, Vol. XVI, pp. 304, 305.

CONDENSERS. See Electricity, Vol. VIII, p. 34; also Electricity, §§ 34, 35, in these Supplements.

CONDITION, in law, a declaration or provision that upon the occurrence of an uncertain event an obligation shall come into force or shall cease, or that the obligation shall not come into force until a certain event. Such conditions are known, respectively, as precedent or subsequent, resolutive and suspensive.

CONDITION, in logic, that which must precede the operation of a cause. It is not regarded as that which produces an effect, but as that which renders the production of one possible. For instance, when an impression is made on wax by a seal, the seal is said to be the cause; the softness or fluidity of the wax, a condition.

CONDITIONED, Philosophy of the, a name given to the system of Sir William Hamilton; q.v., Vol. XI, p. 418.

CONDONATION, a legal term used to express the act or course of conduct by which a

husband or wife is held to have pardoned a matrimonial offense of which the other has been guilty, conditionally on a promise of future behavior. Thus if a wife voluntarily cohabits with her husband after she has discovered that he has been guilty of adultery, she is held to have condoned the offense, and such condonation is a bar to an action for divorce unless the original offense has been revived by subsequent matrimonial offenses.

CONDUCTIVITY. See ELECTRICITY, Vol. VIII, p. 52; also ELECTRICITY, §44, in these Supplements.

CONDUCTORS AND INSULATORS. See ELECTRICITY, § 6, in these Supplements.

CONDUCTORS AND NON-CONDUCTORS. See ELECTRICITY, §§ 10, 11, in these Supplements.

CONDURANGO, the name of several asclepiadaceous woody climbers of South America, whose bark affords a drug used as a remedy for venomous bites. The plant is usually referred to *Marsdenia condurango*. Also written *cundurango*. It had a brief reputation as a cure for cancer.

CONE, in botany, a flower whose sporophylls (stamens and carpels in flowering plants) are inserted close together upon an elongated axis, forming an approximately cone-shaped body. The most notable illustration is the characteristic carpellary cone of the pines, spruces, etc., which gives the name *Coniferæ* to one of the three great divisions of Gymnosperms. It should be said that the morphology of the cone of *Coniferæ* is in dispute, some regarding it as a cluster of flowers, rather than a single flower. Cones are also common in *Equisetum*, *Lycopodium* and *Selaginella*, genera of Pteridophytes, although they are included among what commonly are called "flowerless plants."

CONEMAUGH FLOOD, a name given to the most disastrous flood known in American history. It occurred in Johnstown, Pennsylvania, in the afternoon of May 31, 1889. About ten miles above Johnstown, on the South Fork Creek, a little above its junction with the Conemaugh River, was a dam owned by the "South Fork Fishing and Hunting Club," an organization of wealthy men, most of them residents of Pittsburg. By means of that dam the water of the creek and upper watershed had been accumulated, forming an immense reservoir, bearing the name of Conemaugh Lake, stocked with fish. Weakened by heavy rains, the dam gave way and the freed waters rushed down the valley with the speed of a race-horse, sweeping away most of the hamlets and villages of Woodvale, Conemaugh, South Fork, Mineral Point, Morrellville, and the large villages of Cambria City and Johnstown—the whole borough familiarly called Johnstown City—embracing, with the hamlets and villages, an estimated total population of 45,000 living on the direct line of the flood. The wreckage was complete, and was rendered more appalling by the obstruction of floating wreckage at the stone bridge of the Pennsylvania railway. Whole houses, in which families were imprisoned, at this point were hurled bodily upon each other, or submerged beneath the rushing waters. Then the obstructed timbers caught fire from an overturned stove. Pinned in the wreck, hundreds of men, women and children were burnt to death.

The loss of life in the valley reached a total of 2,500; 99 entire families were lost.

An appeal for aid met with generous response, both in the United States and abroad. A Flood Relief Commission was appointed to receive the donations, which reported the total cash contributions as $4,116,801.58. Of this amount, $2,912,346.30 passed through the hands of the relief commission, divided as follows: Contributions sent to Governor Beaver, $1,236,146.45; contributions disbursed by Philadelphia Permanent Relief Committee, $600,000; by Pittsburg Relief Committee, $560,000; by New York Relief Committee, $516,199.48. The expenditures by the commission were $2,845,140.83, of which $2,592,936.68 went to the relief of the Conemaugh valley, $246,475.26 to the relief of other portions of the state, and $5,728.89 for general and office expenses.

CONEY ISLAND, New York's popular seaside resort, situated at the southwestern end of Long Island. In 1894 it was annexed to Brooklyn. Coney Island is five miles long from east to west, and averages less than a mile in width. Sandy, windswept, and barren, but sixty acres of its area are arable. Its popularity is due to its propinquity to the eastern metropolis and its five-mile ocean beach of firm, white sand, which, gradually sloping into deep water, and free from undertow, renders it very suitable for bathing.

Until 1874 it was an almost entire waste. Today it boasts of a series of handsome summer hotels, concert halls and bathing-houses, with all the minor features of popular-priced entertainment for the vast daily crowds of visitors. Coney Island practically forms part of the eastern shore of New York's lower bay. Commencing at its western extremity with Norton's Point, where a lighthouse is maintained, the island is historical as the place of Henry Hudson's landing, Sept. 3, 1609. Here his crew fell foul of the Canarsie Indians, and at Norton's Point the crew of the *Half Moon* dug the grave of the first white man slain by savages in New England. But Coney Island's present popularity has little to do with antiquity. In four principal divisions — West End, West Brighton, Brighton Beach and Manhattan Beach — it forms a long five miles, frequented by pleasure-seeking humanity, and grading from the cheap Bowery end, with its attendant rowdiness, to the loose exclusiveness of the Oriental Hotel at Manhattan Beach, where, in the season, Bohemians congregate and high-class music can be heard. All parts of the island are reached by steam, elevated and trolley railroad lines and by steamboats from New York City, Jersey City, Brooklyn and elsewhere. Coney Island's freedom has almost passed its name into a proverb as that of a popular, free-and-easy seaside resort. Its value as a breathing-spot for the teeming inhabitants of

Greater New York cannot be over-estimated from a hygienic point of view.

*CONFEDERATE STATES OF AMERICA OR SOUTHERN CONFEDERACY. From its inception compelled to defend its claim of independence by force of arms, the external history of the Confederacy of America is the history of the Civil War; and that will be found recorded under UNITED STATES, Vol. XXIII, pp. 773 et sq.

It remains only to give a brief account of the interior political history of this government. From the days when South Carolina attempted to nullify the tariff of 1828 up to the admission of California in 1850, national politics had turned upon the effort to maintain an equilibrium between Northern and Southern states. Until the latter part of this period the predominance of the South in public matters practically went unchallenged. As stated by Alexander H. Stephens, for sixty years Southern Presidents had ruled the United States, as compared with 24 years' tenure of office by statesmen chosen from Northern states; 18 judges of the supreme court had hailed from the southern side of Mason and Dixon's line, as against 11 from the northern side. In the matter of the presidents of the Senate (*pro tem.*), 24 Southerners had filled the office, as compared with 11 Northerners; of 35 speakers of the House of Representatives, no less than 23 were from the South; of Attorney-Generals, 14 were Southerners to 5 of the colder climate; 86 foreign ministers out of 140 had been furnished by the land where cotton was king; while, to complete the picture, a vast majority of the army and navy officers, and fully two thirds of the Federal office-holders, were natives of that section of the country, which contained one third of the white population of the republic, and seemed to rule the remaining two thirds.

The causes which brought about the clash between the North and South in feats of arms were as follows: The War of 1812 merged all partisan differences into one policy, represented by Monroe. His administration was Democratic (then called Republican) in name, but Federalist in measures, and its exemption from political factions led men to style the times "the era of good will." New political alignments were to grow out of the ambition of members of his Cabinet, which contained Crawford of Georgia, John C. Calhoun, John Quincy Adams and William Wirt. Calhoun, a man of great insight and force of character, and not destitute of ambition, sought to make his section a unit in national affairs and thus preserve its ascendency, as a united South could have a predominance denied a divided North. If he could establish such a political equilibrium, there would be the reward of Southern gratitude, and the probable possession of the White House at Washington for a Presidential term or two. His own state of South Carolina, in its attempted nullification, was left without general support, and it was seen that neither questions of trade nor any abstract notion of states' rights would unite the South. At this time slavery had virtually disappeared north of Mason and Dixon's line, and that institution had become localized. It furnished an adequate ground upon which to build Southern unity, and it was the labor of Calhoun's life to bring that about. Long after his death the preservation of the equilibrium between the Northern and Southern states lay at the core of national politics. The issue was the more unfortunate, as it was not one of simple expediency, but touched the moral sentiment of the nation, making sensitive those who defended slavery, and aggressive those who opposed it. It left no secure basis for compromises; and these, when made, were short-lived.

From 1833 until the firing upon the *Star of the West*, slavery, its extension or restriction, was the dominant issue between the great parties, and the South, with honest logic, believed that those who would restrict would ultimately extinguish.

When the question arose of law for the organization of Kansas, the administrations of both Pierce and Buchanan threw their weight on the side of the slave power in that territory. The turmoil and violence attending the organization of Kansas constituted the first physical strife between the slave and free states for predominance on any given territory, and the free states party won. It then became evident that the South had lost control forever of the long-maintained balance between slave and free states in the United States Senate, in so far as that balance rested upon an equal number of both kind of states in the Union. A feeble defense for the Southern institution was found in the Supreme Court, which, in the Dred Scott case, ruled that slavery was an institution of domestic concern, intrenched as such in the Federal constitution, and that any legislation concerning it was beyond the power of Congress. Owing to the feebleness inherent in the judiciary, especially in times of high political passion, it was seen that the Supreme Court was but a broken reed for Southern hopes, and in Mr. Buchanan's Cabinet there were men who began at once to plan for the success of a secession movement, which was foreseen to be imminent. Vessels of the navy, by a Northern Secretary of War, were sent far away; arms and munitions of war were removed from Northern to Southern arsenals; the credit of the government was impaired. At this time it was given out that the Republican party, which had evinced surprising strength in the elections of 1856, would, if it elected a President, justify the South in retiring from the hated compact of Union.

In order to bring about this pretext for disunion, fire-eating leaders contrived to disrupt the Democratic convention which met in Charleston in 1860. Had the Democratic party then been united it would still have controlled all departments of the government. Instead thereof, two Democratic tickets, one headed by Breckenridge of the states' rights party, and the other by Douglas as the regular nominee, were put in the field, and Mr. Lincoln, in consequence, obtained a

*Copyright, 1897, by The Werner Company.

majority of the electoral votes and was made President. Mr. Lincoln's popular vote was nearly four hundred thousand less than the ballots cast for the two Democratic nominees.

The day after the election, and on mere report that Mr. Lincoln had been constitutionally chosen President, the legislature of South Carolina summoned a convention to meet at Columbia to take that state out of the Union and pass bills for enrolling and arming the militia. On the 20th of December the convention of that state seceded in a manner subsequently followed by all other states that joined the Southern Confederacy, namely, by simply repealing all former acts ratifying the Federal constitution. At once the governor confiscated all United States property in the state except Fort Sumter, in Charleston harbor, to which Major Anderson, in anticipation of this action, had transferred from Fort Moultrie a little garrison of eighty men.

The course of South Carolina was followed by Mississippi on the 9th of January, 1861; on the 10th by Florida; on the 11th by Alabama; on the 19th by Georgia; on the 26th by Louisiana; and on the 1st of February by Texas. The Federal government was able to hold Fort Pickens, in Pensacola harbor. Thus there were seven states avowedly out of the Union, and they were resolute to draw to their support the remaining eight slave states.

In Washington the winter passed with dissension and strife in the Cabinet, and in futile efforts to find some method of compromise. Cass left the Department of State in December because President Buchanan would not reinforce the troops in Charleston Harbor; Cobb abandoned the Treasury in January, and went home to Georgia to forward the secession of that state. In December, Floyd forsook the War Department because Fort Sumter and Pensacola were not given up to the states in which they were located. Thompson of the Interior Department was engaged in efforts to instigate the secession of North Carolina, acting as the agent of Mississippi for this purpose, while still holding office under the government he was trying to disrupt. By the middle of January, Mr. Buchanan's Cabinet was reconstructed, but no aggressive movements could be expected from it during that President's term. In February, General Twiggs, having the largest collection of troops of the army under his command, surrendered it in Texas to an officer of the provisional Confederate government. Many of the officers and privates came North and did good service for the Union cause.

On the 4th of February, 1861, a congress of delegates from the seven seceded states met in Montgomery, Alabama, prepared a provisional constitution, and elected Jefferson Davis President and Alexander H. Stephens Vice-President. It then proceeded to draw up a permanent constitution, which was adopted unanimously on the 11th of March. But the President and Vice-President remained in provisional office until the 22d of February, 1862, when they were inaugurated for a term of six years by virtue of an election held in the Confederacy in the preceding October. On the 21st of May, 1861, the government and Mr. Davis removed to Richmond, Virginia, and on the 18th of February, 1862, the first Congress under the permanent constitution assembled in that city.

The Confederate constitution was framed upon the lines of that of the United States; it differed from that in the recognition of the sovereign and independent character of each state in the Confederacy; in the declaration that slavery was to be protected in all new territories; in the prohibition of protective tariffs and of the expenditure of Confederate money for internal improvements; in the lengthening of the executive term to six years, and making the President ineligible for re-election; in conferring upon the heads of departments the right to debate in Congress. New states were to be admitted on a vote taken by a poll of the states; state legislatures could impeach Confederate officers each within its own jurisdiction. The declaration of free trade was virtually a device to secure the support of Great Britain, whose textile industries were dependent upon the export of cotton, and whose traditional policy was always for securing and retaining new markets. The constitution further provided for the rendition of fugitive slaves to their owners, and that five slaves should count as three persons in the basis of representation or taxation. The new Congress immediately began to emit bills of credit payable ninety days after the Confederate States had secured their independence. The new government passed almost immediately to a paper currency, which from time to time was emitted freely, until before the close of the war it was practically valueless, and financially the Confederacy was virtually in the same condition as France in 1792. A small loan of ten million dollars was taken in France and England. It was proposed at that time that a loan of fifty times as much should be offered abroad in order to secure in foreign countries financial interest in the success of the Confederate arms, and also to give ground for interference in the American strife by the governments of France and England. Mr. Davis's government had not the courage to make this attempt, and those who had invested in his foreign securities eventually lost their money.

When Mr. Lincoln was inaugurated he found an enemy in possession of seven states, occupying over 560,000 square miles, and inhabited by nearly five million persons, of whom about half were black. In the eight border states was a population of seven and a quarter millions and an area of about 320,000 square miles, in which the ratio of the blacks to the whites was less.

Much depended upon the course that should be taken by the border states, in which there existed a strong sentiment of Union. In fact, this sentiment was so strong that the friends of secession were fearful of risking their case in conventions and popular elections. It was felt that some bold and bloody means should be

taken to break up the passive attitude of the border states. The occasion for firing the Southern heart was found at Fort Sumter, then besieged by an army of seven thousand men under Beauregard. The attempt to provision that fort in January had been frustrated by arms, and the steamer *Star of the West* fired upon. On the 11th of April, 1861, the Confederate general, Beauregard, demanded the surrender of the fort, and on the refusal of his terms, ordered its bombardment. On the following morning, fire was opened, and on the 13th Major Anderson surrendered his feeble garrison with the honors of war. The effect was electric, and the response of the North was the rapid gathering of militia to the defense of Washington.

On the other hand, the border states were quivering with excitement, and contemptuously refused to place their militia under the command of President Lincoln. Virginia, which, on the 4th of April, had defeated the secession ordinance by a two-thirds vote, in convention on the 17th voted it in secret session, and her executive authorities proceeded at once to seize the Norfolk navy-yard and Harper's Ferry arsenal, with their immense stores of ordnance and ammunition.

These summary proceedings were not acquiesced in by the western part of the state, where forty counties refused to recognize the secession ordinance of the convention. On the 11th of June these counties organized a convention which declared them a separate state, and established a local provisional government to act until such time as the state was organized more regularly and admitted into the Union. Arkansas and Tennessee joined the Confederacy on the 6th of May, but eastern Tennessee admitted no allegiance to the confederated states, and was only held in subjection to them by military occupation. North Carolina seceded on the 20th of May, and there the process of disruption practically ceased.

Fresh governments were set up in Kentucky, Missouri, and even in Maryland, but their officials had neither resources nor effectual authority. Recruits for the Confederate army were obtained in the border states with considerable freedom, but Delaware, from its position, was helpless.

The government established by Mr. Davis under the permanent constitution consisted of Judah P. Benjamin as Secretary of State; Charles G. Memminger as Secretary of the Treasury; James A. Seddon as Secretary of War; Stephen R. Mallory as Secretary of the Navy; and John H. Reagan as Postmaster-General. The Confederate Congress finally lost all semblance of independence, and became absorbed in the military situation and in criticisms of Mr. Davis. The government degenerated into a military despotism, the act of *habeas corpus* was suspended, conscriptions grew severer, until all the white male population between 17 and 55 years of age was enrolled in subjection to military orders. Congress usually sat in secret session, but in November, 1864, it fell into useless criminations and complaints of Mr. Davis, and into an impotency which left all the vitality of the Confederacy to the President and General Lee.

The overthrow of the Confederate troops in the field put an end to the existence of the Confederate States of America. On the surrender of Lee, Mr. Davis and his cabinet fled from Richmond, some of them abandoning the country. Mr. Davis was taken prisoner in Georgia while on his way to the sea-coast of Florida. The last of the Confederate armies to surrender was that of General Kirby Smith, in the country west of the Mississippi, on the 26th of May, 1865.

It still remains for some competent and unprejudiced historian to weave into a just narrative the vast material which the Civil War produced. Until this shall be accomplished perhaps the best extant authorities upon the subject are *The War Between the States* (1870), by A. H. Stephens; *The American Conflict* (1866), by Horace Greeley; and *A History of the American Civil War* (1870), by John W. Draper.

D. O. Kellogg.

CONFEDERATION OF THE RHINE. See Napoleon, Vol. XVII, p. 211; Germany, Vol. X, p. 500; and Austria, Vol. III, p. 133.

CONFERENCES, in diplomacy, see Congress, Vol. VI, p. 269; in religious bodies, see Methodism, Vol. XVI, pp. 187 et seq. and Methodist Churches, in these Supplements.

CONFERVA, a genus of green, filamentous, unbranched algæ, belonging to the family *Ulothricaceæ*. The family reproduces by the formation of motile spores (*zoöspores*) formed in any cell. In some cases smaller zoöspores are formed which fuse in pairs and form a heavy walled spore (*zygospore*), such a process being sexual. The name *conferva* was formerly applied to all green filamentous algæ, but has now been much restricted.

CONFESSION, the act of one charged with crime in voluntarily admitting his guilt. It is a judicial confession if the admission is made before a magistrate or in court in due course of legal proceedings, and extrajudicial if made elsewhere than in court or before a magistrate. A confession is admissible as evidence against the party making it unless it was procured through threats or promises of favor held out by one in authority in respect to his escape from punishment. Courts do not look with favor upon confessions as evidence against one charged with crime unless they are entirely voluntary.

CONFISCATION, the act of appropriating, without compensation, private property to the public use; also, the act of seizing, by authority, property improperly obtained or held; as, to confiscate a set of burglar's tools or a set of gambling implements. When the goods of a criminal are declared forfeited, and adjudged to the public treasury, they are said to be confiscated. By the terms of an act of Congress passed in 1861, all property used for insurrectionary purposes was declared confiscated. In some European countries confiscation of the estates of an offender has been

imposed as a punishment for certain political offenses.

In international law it is a general rule that the goods of an alien enemy may be confiscated when found within the state, unless there be treaty to the contrary. In the United States it is the rule that the strict right of confiscation exists only in Congress, and without an act of Congress the goods of an enemy found in this country cannot be forfeited. The custom in modern times is usually to provide by treaty, in case of war, that the subjects of each state residing in the territory of the other shall be permitted to remain and continue their business without interference, thus recognizing the right of confiscation under such circumstances, but waiving the right for the purpose of protecting the interests of the citizens of each country who may reside or transact business within the territory of the enemy. Debts due from citizens of one state to citizens of an enemy may be confiscated in the same manner as other property, even though they were contracted during times of peace. Goods which are contraband of war, or which have been captured while under the protection of the enemy, are always confiscated, except when, by agreement, they are returned in exchange for other goods which the enemy have taken, or for prisoners of war, upon such terms as may be agreed upon. The right of confiscation exists to the same extent in civil war as it does when the war is foreign.

CONGAREE, a river of South Carolina, formed at Columbia, the state capital, by the joining of the Broad and Saluda rivers. It flows southeast for about 50 miles, when it unites with the Wateree to form the Santee. It is navigable.

CONGENITAL DISEASES. See PATHOLOGY, Vol. XVIII, pp. 374, 375.

CONGLOMERATE. See GEOLOGY, Vol. X, p. 237.

CONGO (OR KONGO) FREE STATE. See AFRICA, in these Supplements.

CONGO RIVER. See ZAIRE, Vol. XXIV, pp. 763–765; and AFRICA, in these Supplements.

CONGO SNAKE OR CONGO EEL. See AMPHIBIA, Vol. I, pp. 758 sqq.; and AMPHIUMA, in these Supplements.

CONGREGATIONAL METHODISTS. See METHODIST CHURCHES, in these Supplements.

CONGREGATIONALISM IN THE UNITED STATES. For an account of the rise of Congregationalism and its gradual development into an ecclesiastical polity of individual church autonomy, see INDEPENDENTS, Vol. XII, pp. 722–729; CONGREGATIONALISM, Vol. VI, pp. 268, 269. The early settlers in New England, the Puritans, who followed the Pilgrims and landed in the wilderness "for conscience' sake," were not Separatists or Congregationalists. They were dissenters, who still held it an honor to call the "Church of England, from whence wee rise, our deare mother," and who separated only from the sinful corruptions in the worship of God in the mother church. The Presbyterianism of England was likewise transplanted to Massachusetts, and Thomas Parker and James Noyes, who came over in 1634, did not hesitate to teach and preach the essential polity afterward held by a majority of the Westminster Assembly. Indeed, the New England churches early resolved themselves into more or less antagonistic bodies, some holding to "Brownism," some to the "Presbyteriall-government," and some to a middle way between these two, which was ably set forth by John Cotton in his famous book, *The Keys to the Kingdom of Heaven.* The Cambridge Platform, in the drafting of which nearly all the churches of New England took part, and which presented a Presbyterian polity, was at least tacitly accepted by the churches, the divergence being rather upon its interpretation than upon the essence of its rules, and more than two generations passed before any important modifications were made.

Difficulties arose out of the union of church and state. In Massachusetts and New Haven, by the king's letter in 1662, the franchise was limited to those who had a "certificate from the minister of the place where they dwell, showing that they be orthodox in religion," etc. Differences as to what constituted orthodoxy led to endless disputes. Furthermore, the churches were divided into synodists and antisynodists. The synodists maintained that the synod should have power of deciding certain controversies regarding church discipline, while the antisynodists held that only advisory authority was vested in the synod of elders. In Boston this led to the division of the First Church, and the establishment, by the seceders, of the "Old South" Church. The same struggle led to the call for a meeting of the associated ministers in 1705, to consult as to what steps should be taken, "that the councils may have due constitution in preserving the interests of the churches in the country." The essential steps taken related to the formation of a council, whose determinations "are to be looked upon as final and decisive," with the proviso, in certain cases, of an appeal to a larger council, which should have power to declare any church failing to accept its decisions as "no longer fit for communion with the faithful." But this was Presbyterian polity pure and simple, and the strife it engendered led ultimately to a restoration of the original Brownism, purged of its inconsistencies, and molded into the modern Congregationalism. But this result was still distant. When John Wise, an Ipswich clergyman, in 1710, in attempting to lead back the churches to the Cambridge Platform, really presented the fallacies of that platform in such a light as to leaven the whole of New England with views opposed to its direct Presbyterianism, the strife was continued by those advocating "consociation of churches"—a new form of council with definite powers—and by the "Associationists," who wished to create a commonwealth of churches. Both these were supported by some, attacked by others, and finally overthrown by the powerful attack of that "second father of Congregationalism," Nathanael Emmons, one of the most convincing preachers of his age, a consistent theologian, and one of the

most pious and noble men in America. His famous axiom,

"Associationism leads to Consociationism; Consociationism leads to Presbyterianism; Presbyterianism leads to Episcopacy; Episcopacy leads to Roman Catholicism; and Roman Catholicism is an ultimate fact."

became a rallying-point for those who believed with him that the platform of church discipline given in Matthew xviii is right and sufficient, and "if we depart from this, there is nothing in Scripture to prevent our being Presbyterians, or Episcopalians, or Papists."

As late as May, 1844, a meeting of Congregational ministers at Boston reaffirmed almost the same principles of polity as those presented by their fathers in 1805. But the work of Wise and Emmons was bearing fruit, and in June, 1865, 502 elders, representing 25 states, met at the "Old South" Church, in Boston, and set forth the following simple declaration of faith and polity, which has since remained the rule of the Congregational Church:

"*Resolved*, That this Council recognizes as distinctive of the Congregational polity,—

"*First.* The principle that the local or congregational church derives its power and authority directly from Christ, and is not subjected to any ecclesiastical government exterior or superior to itself;

"*Second.* That every local or congregational church is bound to observe the duties of mutual respect and charity which are included in the communion of churches one with another; and that every church which refuses to give an account of its proceedings, when kindly and orderly desired to do so by neighboring churches, violates the law of Christ;

"*Third.* That the ministry of the gospel by members of the churches who have been duly called and set apart to that work implies in itself no power of government, and that ministers of the gospel not elected to office in any church are not a hierarchy, nor are they invested with any official power in or over the churches."

To this declaration was added another provision by the assembly of 275 delegates which met at Oberlin, Ohio, Nov. 15, 1871, and organized there the National Council of Congregational Churches of the United States, viz.:

"The churches, therefore, while establishing this National Council for the furtherance of the interests and work of all the churches, do maintain the scriptural and inalienable right of each church to self-government and administration; and this National Council shall never exercise legislative or judicial authority, nor consent to act as a council of reference."

Congregationalism, while it emphasizes church autonomy, also adds the principle that, all churches being of one divine family, owe to each other fraternal affection and communion, which is manifested by reciprocal recognition, exchange of membership and working together in harmony for the good of all. Inasmuch as distant churches cannot meet as a body for fellowship and advice, they meet by delegation, and the assemblies of these delegates are termed councils.

Any competent number of believers desiring to be organized or received into fellowship may call a council, or any church needing advice, or any aggrieved member in a church that unreasonably refuses to issue a call, may himself call a council. These calls are usually made through written requests, termed letters missive. Councils called by individuals or churches seeking fellowship, or who desire light, are termed "advisory councils"; those called by two parties who stand in any way antagonistic to one another are termed "mutual councils"; and those called by an aggrieved party whom his fellows have refused to join in the call are termed "*ex parte* councils."

The tendency of the later Congregationalism is toward the extension of the principle of mutual sympathy and advice, to include, also, sister churches of other denominations, recognizing only the common faith in an adherence to the teachings of Christ as these may be understood by each individual according to the light given him. This broad principle of universal brotherhood can scarcely fail to exert a salutary influence.

In 1895 there were in the United States a total number of 5,482 churches, with a total membership of 602,557,—a gain since 1890 of 665 churches and 95,715 members. The average yearly gain in number of churches is about 125. In 1895, $2,187,050 were contributed for benevolent purposes, and $7,035,307 for home expenditures. Seven theological seminaries are maintained, located respectively at Andover, Massachusetts; Bangor, Maine; Chicago, Illinois; Hartford, Connecticut; Oberlin, Ohio; Pacific Seminary at Oakland, California; and the Divinity School at Yale University.

Six societies serve to carry on the united work of the denomination. *The American Board of Commissioners for Foreign Missions*, which was organized June 29, 1810, occupied, in 1895, 20 mission fields, with 1,265 stations; had 572 missionaries, assisted by 3,107 native helpers; had 461 churches in these missions, with a total membership of 44,413; had 1,165 Christian schools, with a total enrollment of 53,000 pupils; and spends annually about $600,000.—*The American Congregational Association* was organized in 1853, "to preserve, improve and promote the best use of the Congregational library, and to further the general principles of Congregationalism." The library contained, in 1895, over 73,000 books and pamphlets, and over 47,000 periodicals.—*The Congregational Church Building Society* was organized in 1853 for the purpose of aiding needy churches in building houses of worship. It receives and disburses annually about $140,000.—*The Home Missionary Society*, which was organized in 1826, has for its object the promotion of home missions, organizing new churches, and assisting in the support of their ministers until these mission churches become self-supporting. Up to 1895 this society had organized 6,339 missions, and had disbursed $17,411,950. The yearly receipts now approximate $800,000.—*The Educational Society*, organized in 1816, has for its purpose the assisting of worthy students in colleges and theological seminaries, and to aid in the support of teachers in home missionary colleges and academies in the West and South. This society expends about $150,000 annually. The amount of aid given to a student is usually $75 per annum; to an academy, from $500 to $1,500; to a college, from $1,500 to $5,000.—*The American Missionary Association*, organized in 1846, originated in a general sympathy for the friendless slaves, and its work is still among the friendless of the colored race. The receipts of the society for 1895 were $307,547; expenditures, $337,334.

CONGREGATIONS, ROMAN, are certain committees of cardinals established permanently for the purpose of hearing and deciding, either in the first instance or on appeal, questions or causes referred to the pope as head of the Roman Catholic Church. (See also ROMAN CATHOLIC CHURCH, Vol. XX, p. 629.) There are at least twenty congregations, not counting the special commissions appointed, from time to time, for the

examination of local or special questions. The cardinals (see CARDINAL, in these Supplements) are assisted by various officials and by consultors, all of whom, in a broad sense, are said to belong to the congregations, though strictly only the cardinals constitute these committees. Formerly, all business was transacted in consistory (see CONSISTORY, in these Supplements), but now only the most important affairs are treated therein.

THE CONSISTORIAL CONGREGATION is a committee for the examination and preparation of business to be treated in consistory. It is composed of cardinals, eight to twelve in number, and the pope himself is its prefect. The secretary is a prelate, the same who is secretary to the College of Cardinals. The process for the appointment of bishops is examined by this congregation, and all matters concerning the erection of dioceses are settled by it. Its office is in the Palazzo della Cancellaria Apostolica. A second congregation, which is auxiliary to the consistory, is that *For Choosing Bishops*. Its work formerly was to gather information in regard to candidates for vacant sees, as well as to suggest to the pope desirable appointments. Practically, to-day it is merged with the committee for the examination of bishops, whose duty it is to examine a person chosen for bishop and find out his knowledge of theology and canon law; for, according to the Fathers of Trent, the simple owning a degree of doctor or licentiate in theology or canon law is not deemed sufficient, but it is required that the one to be promoted to the episcopate shall have obtained this degree meritoriously as the result of work and examination. Still another congregation, that *For Extraordinary Ecclesiastical Affairs*, may be called auxiliary to the consistory. It is a development of the particular committee instituted by Pope Pius VI in 1793, concerning the affairs of the French kingdom. As now organized it consists of fourteen cardinals, with a secretary and eight consultors. The competency of this congregation is not limited to a certain kind of business, but affairs which may be treated in this way better than in the ordinary congregations are assigned to it. Especially, all matters pertaining to concordats and other relations of the Holy See with the governments of the world are committed to it. Further, it treats all the church business of the countries subject to the Russian Empire, and also of those of South America. Its office is in the Vatican Palace, next to that of the Secretary of State. The other congregations may be grouped into those which treat matters of faith, those which attend to questions of worship in the church, and those whose special object is the enforcement of discipline.

THE SACRED CONGREGATION OF UNIVERSAL INQUISITION, or the HOLY OFFICE, was established as a committee in the year 1542 by Pope Paul III. Pope Sixtus V later enlarged and confirmed it as a congregation, and decreed that it should rank as the chief of all the Roman Congregations. The pope himself is its prefect, and the cardinals belonging to it, usually ten, are called cardinal inquisitors. To aid them, twenty-two consultors, six qualificators for examining books, and four lesser officials are assigned to the congregation, all chosen by the pope himself from the most learned canonists and theologians of the secular and regular clergy. They are all bound to absolute secrecy in regard to the questions considered, lest harm come to innocent people through divulging what should remain secret. The sentences and judgments of the Holy Office are the judgment of the Holy See, and are treated by Catholics with great reverence, but they are not considered irreformable, for a rehearing is sometimes granted. *The Congregation of the Index* may be considered an auxiliary of the Holy Office for the special work of examining books and condemning such as may be dangerous to the faith or morals of Catholic people. From the first ages bad and dangerous books were condemned by the church, but Pope Paul IV, in 1559, was the first to make a catalogue of them. The Council of Trent drew up ten rules on this matter, which are still in force, though a revision of them was begun in Rome during 1896. A most careful examination is made of a book before it is prohibited either as bad or dangerous; but the decree of the Index is not considered infallible. Books are sometimes prohibited until corrected. The Congregation of the Index is composed of about thirty cardinals, nearly two thirds of whom live away from Rome. It has also thirty-one consultors and four relators to read books, and report what censure they think should be attached to them. The cardinals in general meeting then decide.

THE COMMISSION FOR THE RECONCILIATION OF DISSIDENT CHURCHES is a new congregation established by Pope Leo XIII, March 19, 1895, for the purpose of considering the questions which may arise concerning the reunion of churches or nations with the see of Rome. The restoration of the Coptic patriarchate and the validity of orders in the Anglican Church were two of the first questions treated in this committee. The pope is its prefect, and eight cardinals were appointed its first members. It has also a proper number of consultors to study and prepare matters referred to it, but the submitting of these questions is performed by one of these consultors designated as secretary by the pontiff.

THE CONGREGATION ON STUDIES tends to preserve the faith and guard the faithful against error, by the institution and proper management of universities and other schools. The first universities, which grew out of cathedral and monastic schools, were approved by the Roman Church, which granted them special privileges, and by its action made the degrees conferred by them receive recognition before the civil as well as ecclesiastical authority. The Congregation on Studies was instituted by Pope Sixtus V as a competent tribunal for the settlement of all questions regarding the rights, privileges and exemptions of these universities. It is now composed of 26 cardinals, one of whom is its prefect, and has a secretary, 11 consultors and 6 officials. The establishment of new universities

and their constitutions are matters over which this committee has jurisdiction. Abuse in conferring degrees (see TITLES, ROMAN CATHOLIC, in these Supplements) by Catholic universities is also in its purview. The congregations which attend to questions of worship in the church are: The Congregations of Rites, on Ceremonies, on Indulgences and Relics, for the Fabric of St. Peter's.

THE CONGREGATION OF RITES was instituted by Sixtus V in 1587. About 35 cardinals, half of whom live away from Rome, make up this committee. They are assisted by 31 consultors and other officials.

THE CONGREGATION ON CEREMONIES is a derivation from that on rites, and it exercises a watchful care over the rites and ceremonies, civil and ecclesiastical, of the court of the pope. It also resolves questions regarding pre-eminence among cardinals and prelates. Further, it instructs those concerned in the conferring of insignia on newly created cardinals. The dean of the College of Cardinals is always prefect of this congregation.

THE CONGREGATION ON INDULGENCES AND RELICS was established by Clement IX, in 1669, to do away with any chance of abuse in the matter of indulgences and relics. It does not grant any indulgence, that being done by the pope, but it sees that indulgences are not abused, and that false relics of saints are not given out as true. Thirty-two cardinals are attached to this congregation. It has also 17 consultors and a secretary, all of whom are prelates, and appointed by the pope.

THE CONGREGATION FOR THE FABRIC OF ST. PETER'S church in Rome is a development of a special committee appointed for the rebuilding of this basilica, and was instituted by Clement VIII in 1593. Formerly it had much work; to-day it has little, other than the care of St. Peter's basilica, the cardinal archpriest of which is always its prefect.

The congregations whose specified object is the enforcement of proper discipline are the Congregation of the Council, with several subordinate committees, and the Congregation of Bishops and Regulars, also with subordinate committees.

THE CONGREGATION OF THE COUNCIL interprets and applies the acts of the Council of Trent in all that relates to discipline, but its faculties do not extend to decrees regarding faith. It is composed at present of 28 cardinals, some of whom reside away from Rome, and it has a secretary, an auditor to summarize cases, and eight officials. A school for young canonists is attached to this congregation. A subcommittee for *Receiving and Examining the Reports of Bishops on the State of their Churches* was instituted by Benedict XIV, in 1740, to relieve the main congregation and facilitate the work of examining and replying to the reports and questions which bishops bring or send to the Holy See at stated times. This is termed the visit *ad limina apostolorum*, and must be made every three or five years by bishops of Europe, and every ten years by those of America and other countries. Another subordinate committee is that *For Reviewing Provincial Councils*, which was established by Pius IX, in 1849, to hasten the review and approval of these meetings of local bishops. Both these committees are made up of some of the cardinals belonging to the Congregation of the Council. In the same way the *Congregation on Ecclesiastical Immunity*, which was instituted by Urban VIII for the protection of the rights and privileges of the church, is now merged into that of the council, and much of its work is done immediately by the Cardinal Secretary of State. The *Congregation on the Residence of Bishops*, also auxiliary to that of the council, treats of questions concerning the obligation of bishops to reside in their own dioceses and other beneficiaries in their benefices. Leave of absence is granted by this committee, which formerly had six cardinals, but whose work is now done by the cardinal vicar of Rome, and the secretary of the Congregation of the Council.

THE CONGREGATION OF BISHOPS AND REGULARS is a union of two committees, one of which treated questions concerning the secular, the other questions concerning the regular, clergy. To insure uniformity they were united in 1601. Twenty-four cardinals make up this committee, and they are assisted by consultors and officials. Questions, either in the first instance or on appeal, which arise between bishops and their clergy, or between the secular and regular clergy, are referred to this committee for settlement, either summarily or by judicial process. By special authorization from the pope, it can also try and remove bishops. Special committees on *The Discipline of Regulars* and *State of Regulars* attend to the observance by religious orders of their special rules and constitutions. Changes are also authorized in these rules when circumstances render them necessary. Most of the work of these committees is now done by that on bishops and regulars.

THE CONGREGATION OF THE PROPAGANDA was instituted to spread the faith in infidel countries and attend to questions of discipline which may there arise among missionaries and bishops. (See PROPAGANDA, Vol. XIX, pp. 809–811.) The Roman congregations usually give no reasons for their decisions. They examine the questions, and simply reply affirmatively or negatively. Though each congregation has its special work, questions once referred to a congregation are treated by it also in those matters which may be in the purview of other congregations. The decision of one congregation is always recognized by all the others. Many cardinals belong to several of these committees, there being only about thirty in Rome to do the work of all. Trials before the congregations, except the Holy Office and the Index, are public. The questions are usually presented to the cardinals in general committee by the secretary of the congregation. When a decision is reached, especially in import-

ant matters, it is referred to the pope for approval. The Latin or Italian language may be used. French is tolerated.

P. A. Baart.

*CONGRESS, AND THE LEGISLATIVE POWER OF THE UNITED STATES. The legislative power of the United States is vested in the Senate and House of Representatives, collectively called The Congress, under the supervision of the veto power granted to the President. Each of these bodies is sole judge of the election, returns and qualifications of its members, and has power to compel attendance of its members. Each may determine the rules of its proceedings, may punish members, and, with the consent of two thirds, expel a member. A majority in each constitutes a quorum, the presence of which is necessary to transact business. Each House must keep a journal, and one fifth of the members in each can cause the yeas and nays to be entered on the journal. Neither House, during the session of Congress, can, without the consent of the other, adjourn for more than three days, nor to any other place than where they shall be sitting. Members of Congress are paid for their services out of the Treasury. At present the compensation is $5,000 per annum, payable monthly, and a mileage of twenty cents for each mile traveled by a customary route in going to and returning from each session of Congress. Members can hold no office under the United States. The Congress meets the first Monday in December of each year, can change by law this time of meeting if it sees fit, and can be called in extra session by the President.

The Senate consists of two Senators from each state, chosen by the legislature thereof for six years, and is a permanent body. No state can be deprived, without its consent, of its equal suffrage in the Senate. Senators are divided into three classes, and one third of the number goes out every second year. Besides its legislative duties, the Senate, by its advice and consent on a two thirds vote, enables the President to make treaties, and by a majority vote confirms the appointments of important officers. The Senate is also a court of impeachment, thus in a limited way having executive and judicial, as well as legislative, functions.

As legislative bodies, the Senate and the House have equal powers; but all bills for raising revenue must originate in the House, except that the Senate may propose or concur with amendments, as in other bills. Custom, also, has made it imperative that the general appropriation bills shall originate in the House. The Senate, however, derives power in many ways from the fact that it is a permanent body and from its participation in executive functions.

The ordinary course of business in the Senate requires that after the journal has been read and approved, the presiding officer shall lay before the Senate messages from the President and communications from the heads of departments, commonly called Cabinet officers, and other communications addressed to the Senate, and also such bills, joint resolutions and other messages as may come from the House. He then calls, in the order named, for the presentation of petitions and memorials, reports of committees, the introduction of bills and joint resolutions, and finally, concurrent and other resolutions. Until the morning business shall have been concluded, and so announced from the chair, or until one o'clock, no motion to proceed to any subject on the calendar is entertained by the presiding officer, except by unanimous consent. Petitions and memorials are referred without putting the question, unless there is objection, in which case all motions relating to reception or reference are put without amendment, except to add instructions. Any matter from the President or House may be taken up at once by motion determined without debate, or the presiding officer may lay it before the Senate. Bills offered may be objected to, and thereupon lie over one day. All bills must be read three times, and, except by unanimous consent, on three separate days. After a bill has been twice read, it may be amended or committed. All bills, after the second reading, are considered by the Senate as in the Committee of the Whole, where any amendments are considered, and then reported to the Senate, where the amendments are again considered, after which further amendments may be proposed. After the third reading, amendments are not in order; but the bill may be sent to a committee, and, after the report of the committee, goes to the calendar, and must be again considered in committee of the whole. After each day's morning business is over, or at one o'clock, unless the Senate otherwise order, all bills not objected to are disposed of, debate being limited to five minutes for each Senator. Objection can be made at any time; but on motion without debate, the Senate may continue consideration. In that case the five-minute restriction is removed. This may go on until two o'clock, or until two hours have expired, if the Senate meets at another time than noon. After two o'clock, or after two hours, the calendar of general orders is taken up. This order of business on the calendar may be interrupted by appropriation bills, a motion to take up some other bill, a motion to pass over the bill under discussion, or a motion to put it at the foot of the calendar. All these motions are decided without debate. Any subject may be made a special order by a two-thirds vote, and special orders take rank by seniority, unless changed by direction of the Senate. When bills go to a committee and are reported, they are placed on the calendar with bills which have been read twice and objected to and not referred. When a bill has been taken up and is under discussion, a motion to take up and consider another bill on the calendar, or any question of privilege, disposes of the first, which cannot be again resumed except by a direct vote of the Senate. The precedence of motions is as follows: To adjourn, to adjourn to a day certain, or that when the Senate adjourns it be to a day certain, to take a recess, to proceed to the consideration of executive business, to lay

*Copyright, 1897, by The Werner Company.

on the table, to postpone indefinitely, to postpone to a day certain, to commit, to amend. It will be seen that there is no motion for the previous question; hence there is no method of closing debate except by unanimous consent. On an amendment, however, debate may be closed by laying the amendment on the table, which does not carry the bill with it.

The foregoing is a brief outline of the method of doing business in the Senate, according to the standing rules. In practice this system is much modified by what is called "Senatorial courtesy," which is but another name for the comity that grew up naturally in a body originally small in number, where every consideration is extended by the members each to the other. Sometimes it is claimed rather to the detriment of public business. In ordinary assemblies, for instance, a member discusses a question only when it is before the body for action. In the Senate, if a Senator announces that at a day named in the future he will state his views on a bill presented by him or some one else, he is permitted so to do, and speaks without limit. At no time is there any limit to the time a Senator may speak. Seventy-two hours with intermissions, and 14 hours without intermission, are perhaps the highest records thus far made.

In the House of Representatives, now composed of 357 members, there is necessarily a different system of procedure and different rules. In the days of John Quincy Adams, all matters, even petitions and memorials, were presented in the open House, and much time was consumed in mere routine. Among the more valuable reforms introduced into the House in the Fifty-first Congress (1889–91) was that system which now prevails, by virtue of which, without taking any of the time of the House, all bills, petitions, memorials and communications from the heads of departments and bills from the Senate are referred by the Speaker to appropriate committees, and all reports of committees, or rather the accompanying bills, except those which are privileged, are placed upon the calendars to which they belong. Messages from the President are always read to the House.

The calendars are three in number: The House Calendar, the Union Calendar and the Private Calendar. To the Private Calendar go all the private bills, to the Union Calendar all bills which appropriate money or require such appropriations. The House Calendar receives all other bills. No bill goes to either calendar until reported from a committee.

The order of business is as follows: Bills which do not carry appropriations, and which, having passed the House, are amended by the Senate and sent back, are first disposed of, and then the same class of bills passed by the Senate and sent to the House, which are substantially the same as bills of the House already reported by a House committee, can be disposed of when that committee request it. After this comes the unfinished business of the previous day, and next the morning hour for the consideration of bills. These bills must be on the House Calendar, and must be called up by the committees. The morning hour is not necessarily limited to sixty minutes, but may continue all day if the House so desire. At the end of sixty minutes, however, the House may go into the Committee of the Whole House on the State of the Union, either to take up bills in their order, or, when a committee authorizes a motion to be made, to take up a particular bill. If motions for these purposes are voted down, then the morning hour continues until the adjournment, or until the business in hand is finished. All appropriation bills, and bills to raise revenue, are considered first in a Committee of the Whole House on the State of the Union. The general appropriation bills, which provide for the different branches of the public service, and bills to raise revenue, have the right of way against everything but questions of privilege and conference reports. They cannot interrupt other business already begun, but may at any other time obtain consideration. On Fridays, private bills are entitled to be considered, unless the House refuses to go into the Committee of the Whole, in which case the public business proceeds as on other days. Congress not only legislates for the whole country, but in particular for the District of Columbia. Hence on the second and fourth Mondays of each month District of Columbia business is in order.

On the first and third Mondays of each month, and during the last six days of each session, the rules may be suspended and bills and resolutions may be passed by a two-thirds vote after a discussion of forty minutes, one half of which is given to either side. The precedence of motions in the House is as follows: To adjourn, to lay on the table, for the previous question (which motions shall be decided without debate), to postpone to a day certain, to refer, to amend, or to postpone indefinitely.

It will be seen that, unlike the Senate, the House has the motion for the previous question, and it may be added, that as the previous question may be ordered on any proposition or motion and on a bill to its final passage, the closure is ample. To prevent, however, undue use of it, no main question can be ordered to a vote without debate; for, unless there has been previous debate, forty minutes are allowed, except where the bill has been in a committee of the whole. There are two committees of the whole; the Committee of the Whole House on the State of the Union, in which appropriation bills and revenue bills are considered, and the Committee of the Whole House, wherein are considered private bills alone.

In the House, and in these two committees, each member is limited to one hour, and can speak but once, though this last prohibition is much disregarded. In committees of the whole, after general debate on the whole bill is closed, the bill is open to amendments, and to remarks for or against the amendment, limited to five

minutes for and five minutes against. This is called debate under the five-minute rule. By the device of amending by striking out the last word, this kind of debate is often kept up a long time, as the five minutes are often lengthened by unanimous consent.

Bills and joint resolutions, of course, have to pass both Houses to become law, or in case of concurrent resolutions, to accomplish their purpose. Hence there must be communication between the two Houses, and some joint action. Such communication is by way of messages presented by the clerk of the House to the Senate, and by the secretary of the Senate to the House, and by the conference committees. Each House receives in person or by deputy the clerk or secretary of the other, and suspends all business to receive the message, which is disposed of under the rules of each body. When the two Houses have reached a point of disagreement, each appoints a conference committee of several members, usually three, who meet each other and endeavor to compose the differences. If they do not succeed, each committee reports the continued disagreement to its own House, which either lets the matter drop, in which case the bill is lost, or asks another conference. If the two committees, by a majority of each, agree, then the agreement is reported, and if the two Houses ratify the agreement, the bill thus modified becomes law, so far as the two Houses can make it so.

Under the constitution, however, the bill, after passing the two Houses, must undergo the scrutiny of the President. If he approves it, he signs it, and it becomes a law; if he does nothing, and Congress remains in session for ten days (Sundays excepted) after the bill is presented to him, it becomes a law; otherwise not. If he disapproves the bill, he transmits it, with his objections, usually called a veto message, to the House in which it originated. The objections are entered in the journal, and that House proceeds to reconsider it. If, after such reconsideration, two thirds of that House agree to pass the bill, it is sent, together with the objections, to the other House, and if that House passes it by a two-thirds vote, it becomes a law. The votes of both Houses must be by yeas and nays.

It will be seen that the President thus exercises a very important legislative power, and that a veto message makes one man in either House who thinks with the President the equal of the two who do not.

Such, in general, is the way of doing the routine business of both Houses. In both of them it will be seen that the work and direction of affairs are largely in the hands of committees. In the Senate, a bill, which in this article is used as a general term to include all propositions presented, may go to a committee or not, as the Senate may determine. In the Senate, a committee may, by order of the Senate, be discharged from the consideration of a particular bill, and required to report it back to the Senate, which may then act upon it. In practice, almost all the work is done by committees, certainly in all important cases. In the House, all matters, even those relating to the House alone, go to committees as of course, and are there discussed, acted upon and reported, or laid aside and not reported. The House cannot, under its ordinary course of procedure, discharge one of its committees from the further consideration of a bill and order it reported for action. There are no provisions in the order of business for such a course. The committees of the House have therefore the most complete control of the bill in its early stages. When it is brought into the House and is laid before the House for consideration, it is still under the fostering care of the committee; for the custom of the House requires, or rather expects, that the members of the committee shall first be heard in explanation of the bill, and in debate thereon. This proceeds upon the theory that they, having given special study to the subject, are best fitted to enlighten the House upon it.

Such is the great amount of business presented to the Congress, more than ten thousand bills being before the House of Representatives every two years, that a very small percentage of it is ever discussed or passed upon. A report from a committee is very far from being a passport to consideration, though without a report no progress can be made.

Such being the power of committees, it is important to know how they are created. In the Senate, they are chosen apparently by the body itself, but the choice is really made by caucus committees, selected by each side after division is made between the parties. The Senate thereupon ratifies the action taken. The House is too large a body for such a method. Committee appointments there are all made by the Speaker and announced to the House. Naturally, the Speaker has great power in determining the general policy of the House at the outset. At least, as the power is necessarily vested in him to determine who shall first be recognized in many cases to offer business to the House, he is forced to give much attention to the whole state of public business. As the general order of business is far from reaching all the matters which have to be taken up and disposed of, the Committee on Rules, of which the Speaker is chairman, has gradually become a committee on order of business, and has the power at any time to direct what matters shall be taken up, the method of procedure and the limitation of debate and amendment. The use of this power depends entirely on the amount of business deemed advisable to be done, which, in turn, depends on public sentiment.

The first Senate had 26 members; the Senate of 1896, 90 members. The constitution prescribed that the first House of Representatives should consist of 65 members. The House of Representatives now consists of 357 members. The Representatives are chosen every second year, and the term of service begins the fourth

day of March following the election, which takes place at a time fixed by each state, but this time is usually during November of the even years. Their number is fixed by law, based on the preceding decennial census, and is distributed among the several states in proportion to population, but each state creates its own representative districts, or may elect members at large; that is, members chosen by the entire vote of the state, when the apportionment is in excess of the number of districts. Territories are represented by one delegate each, who may address the House and receive the same pay and perquisites as a member, but cannot vote.

T. B. REED.

CONGRESSIONAL APPORTIONMENTS. See CONGRESS, AND THE LEGISLATIVE POWER OF THE UNITED STATES, in these Supplements.

CONGRESSIONAL LIBRARY. See NATIONAL LIBRARY and ARCHITECTURE, in these Supplements.

CONGREVE, RICHARD, an English author; born Sept. 4, 1818, and educated under Arnold at Rugby, passing afterward to Wadham College, Oxford, of which he became successively scholar, fellow and tutor, but resigned after having become definitely a disciple of Comte. In 1855 he published a good edition of Aristotle's *Politics*. Later works are *Lectures on the Roman Empire of the West* (1855); *Elizabeth of England* (1862); *Essays—Political, Social and Religious* (1874).

CONGRUITY, a term applied in geometry to lines and figures which exactly correspond when laid over one another. See COINCIDENCE, in these Supplements.

CONIFERÆ OR CONE-BEARERS. See VEGETABLE KINGDOM, Vol. XXIV, p. 131; also ARBORICULTURE, Vol. II, pp. 315, 321.

CONINE OR CONIA ($C^8H^{15}N$), (or $C^8H^{17}N$, according to Hofmann), a liquid and volatile alkaloid extracted from the HEMLOCK (*Conium maculatum*); q.v., Vol. XI, p. 647. The seeds are crushed and distilled with sodium hydrate, and after passing through several other processes the product is dried over some fragments of calcium chloride and rectified in a vacuum. Conine is a limpid, oleaginous liquid, with a penetrating and nauseating odor, recalling that of hemlock. It boils at 168°, and is a deadly poison.

CONIROSTRES, a class of birds in which Cuvier included a great variety of forms with a strong conical bill. Later authors sometimes use the term to include finches, weaver-birds and tanagers, but it is practically obsolete.

Two filaments of *Spirogyra*, showing conjugation. A. Gametes; Z. Zygospore. (Original.)

CONJUGATION, in botany, a sexual process found among the lower algæ and fungi, and distinguished from *fertilization*. The two sexual cells are known as *gametes*. The fusion of similar gametes is called conjugation and the product a *zygospore*. The fusion of dissimilar gametes (spermatozoid and oösphore) is called fertilization and the product an *oöspore*.

CONJUNCTION, in astronomy, one of the aspects of the planets. Two heavenly bodies are in conjunction when they have the same longitude; that is, when the same perpendicular to the ecliptic passes through both. The sun and moon are in conjunction at the period of new moon. In general, a heavenly body is in conjunction with the sun when it is on the same side of the earth and in line with the sun.

CONKLING, ROSCOE, an American Statesman, was born in Albany, New York, Oct. 30, 1829; died in New York, April 18, 1888. His father, Alfred Conkling (1789–1874), served in Congress in 1821–23, and was minister to Mexico in 1852. The son received an academic education, removed to Utica, studied law, and was admitted to the bar in 1849. In 1850 he became district attorney for Oneida County, and was made mayor of Utica in 1858. In that year he was chosen as a Republican to Congress, and was re-elected in 1860; was defeated in 1862, but was re-elected in 1864. In this term he was made chairman of the Committee on the District of Columbia, was a member of the Committee on Ways and Means, and of the special reconstruction committee of fifteen. His first important speech was in support of the fourteenth amendment to the constitution. He attacked McClellan's generalship, opposed Spaulding's legal-tender act and advocated the prosecution of the Civil War.

ROSCOE CONKLING.

Mr. Conkling, on resuming his seat in Congress in 1864, took a violent dislike to James G. Blaine, who had been elected to Congress in 1862, which resulted in mutual recriminations on the floor, as well as attempts to injure each other's interests elsewhere. Probably Mr. Blaine owes his defeat for the Presidency to the bitter attacks and untiring work against him of Mr. Conkling.

Mr. Conkling was re-elected in 1866, and in January, 1867, took his seat in the United States Senate to succeed Ira Harris, and was re-elected in 1873 and in 1879. He was a member of the Judiciary Committee, and of nearly all of the leading committees on commerce and revision of the laws. He was instrumental in the passage of the Civil Rights Bill, and advocated the resumption of specie payments. In 1877 he took an important part in framing the Electoral Commission Bill, which he supported by an able speech.

Mr. Conkling received 93 votes for the Repub-

lican nomination for President in the Cincinnati convention of 1876. When President Hayes showed a disposition to adopt conciliatory measures toward the South, Mr. Conkling was foremost in opposing the movement, and organized the "stalwart" faction of the Republican party. In 1881 he became hostile to President Garfield's administration on a question of patronage, claiming, with his colleague, Thomas C. Platt, the right to control Federal appointments in his state. They finally resigned their seats in the Senate, and appealed to the legislature of New York for a re-election as a vindication of their course; but they were unsuccessful, and Mr. Conkling resumed the practice of law in New York City.

In June, 1880, at the Chicago convention, he nominated General Grant for a third term in an eloquent speech, the opening lines of which have become historical:

> "When asked whence comes our President,
> Our sole reply shall be,
> He hails from Appomattox and
> Its famous apple tree."

Mr. Conkling declined the nomination of justice of the United States supreme court, offered by President Arthur, and practiced law until his death, on April 18, 1888, which was occasioned by exposure to the memorable snowstorm which swept New York city on March 12–13, of that year.

CONLIN, BERNARD, American actor; known to the public as WILLIAM J. FLORENCE; born in Albany, New York, July 26, 1831. In his boyhood he took part in neighborhood amateur theatricals, and first appeared as a professional in the character of Peter, in the *Stranger*, at Richmond, Virginia, Dec. 4, 1849. He went to New York, and for the next three years took star parts and supported Forrest at Niblo's Garden, Wallack's Theater, and the Broadway Theater. He married Malvina Pray in 1853. She afterward starred with him in America and England, and contributed much to the successes of his life. Florence was best known for his Bardwell Slote, in the *Mighty Dollar;* Sir Lucius O'Trigger to Joseph Jefferson's Bob Acres, in the *Rivals;* and with the same actor, in the *Heir at Law*, as Zekiel Homespun. It has been said that in adaptability to parts and in the portrayal of varied emotions he has never been equaled. He published a volume of short stories. Died in Philadelphia, Pa., Nov. 20, 1891.

CONNAUGHT AND STRATHEARN, ARTHUR WILLIAM PATRICK ALBERT, DUKE OF, the third son of Victoria, Queen of England, was born at Buckingham Palace, May 1, 1850. He entered the Royal Military Academy at Woolwich in 1866 as a cadet; was commissioned a lieutenant in the Royal Engineers in 1868 and in the Royal Artillery in 1869. Thence he was trained in infantry duties in the Rifle Brigade, attaining the rank of captain in 1871. On obtaining his majority in that year, Parliament voted him an annual sum of $75,000, adding $50,000 more on his marriage to the Princess Louise Margaret of Prussia, March 13, 1879. After various appointments on the staff, including that of assistant adjutant-general at Gibraltar, the Duke was promoted to the rank of general of brigade in 1880. He commanded the brigade of Guards in the Egyptian expedition of 1882, was commander of the forces in Bengal, India, and later held various English commands, being advanced to the rank of full general on being appointed commander-in-chief at Aldershot.

CONNECTICUT. The population of Connecticut in 1890, according to the decennial cen-

STATE SEAL OF CONNECTICUT.

sus, was 746,258, an increase of nearly 20 per cent over that of 1880, which was 622,700. The inhabitants of the state, other than white, consisted of 12,820 colored, 129 Asiatics and 24 Indians. The rank among the states and territories in 1890 was twenty-ninth, a fall of one since the census of 1880. The male population constituted 49.52 per cent of the entire number, and the female 50.48 per cent. A little over 51 per cent of the entire population live in the 17 cities of the state.

The climate of Connecticut is not subject to extremes of either heat or cold, the mean for summer being about 68°, that for winter about 28°. The mean annual rainfall averages close to 52 inches. During 1893 the total number of deaths in the state was 14,901, or about 18 per 1,000 of population, accepting the estimate for that year as given by the state officials, which was 797,450.

Manufacturing, long the leading industry of the state, was increased during the decade preceding the census of 1890 over the one of 1870 to 1880 by exactly the same percentage that marked the growth of population during the same period, viz.; 19.84 per cent. The census report gives the number of manufacturing establishments as 6,822; their aggregate capital, $227,004,496; employees, 149,939; product of the value of $248,336,364; and wages paid, $75,990,600. These figures all give the rank of fifth to the state, but in diversity of manufactures the rank is first. The manufacture of cotton-goods comes first in importance among the many lines produced, that of woolens ranking second. After these come hardware, brass and copper goods of all kinds, sewing-machines, silk and silk goods, plated and Britannia ware, mixed textiles, paper, clocks, tools, boots and shoes, hats and caps, rubber boots and shoes, and rubber goods, etc.

The agitation of the subject of child-labor in factories has borne its best fruits in Connecticut, where the number of children employed was cut down from 8,845 in 1880 to 3,085 in 1890, the greatest decrease recorded in any of the states. Trade and industrial education has also received much attention, and some excellent schools have

been established for the preliminary education of those youths who are about to take up some one of the mechanical trades.

The principal agricultural product of the state is tobacco, of which the state raised 8,874,924 pounds in 1889, giving the rank of eleventh in the census reports. In the same year, 593,691 bushels of oats were raised, 214,935 bushels of rye, and 46,104 bushels of buckwheat. Corn, wheat and barley are also grown in the river valleys, which are very fertile. Potatoes and hay are produced in large quantities, and in localities accessible to New York markets, vegetables and small fruit are grown with much more profit than the cereals. Dairy-farming has always received much attention, the hill lands affording excellent pasturage. Seed-growing has proved a profitable pursuit, and in 1890 the state had 85 farms devoted to this branch of agriculture, a greater number than was reported from any other state. The total number of farms reported was 26,350, having an acreage of 2,253,432. The estimated value of the lands, fences, buildings, implements and live-stock was given as $108,050,708, and the value of the farm products, $17,924,310.

The timber of the state is chiefly hickory, white, red and yellow oak, ash, chestnut, white walnut, beech, birch, maple, elm and wild cherry. Limestone for lime, marble and red sandstone are all profitably quarried, as are flagstone, granite and gneiss. Fire-clay, tiling-slate, kaolin and hydraulic lime are also produced and shipped without the state in large quantities. While copper and lead, both combined with silver, are found in considerable quantities, the working of mines has not been carried on to an extent to make the business profitable. Iron ore is found in considerable quantities in many localities, and has been mined for more than a century.

Ten life and accident insurance companies have their general offices in the state, the aggregate of whose gross assets amounts to $141,625,628. Ten insurance companies, other than life and accident, are also local institutions, with a combined paid-up capital of $10,675,000. There are 2 fraternal companies in the state, making the total number of Connecticut corporations in this line of business 22. These bring into the state an immense annual revenue from all parts of the country, and the receipts from the mutual companies alone, as taxes, for 1895 was the sum of $269,265.72.

In 1893 there were 335,879 depositors in 87 savings banks, whose total deposits amounted to $133,967,220,—almost $400 to each person.

The grand list or statement of all taxable property for 1894 is given as $414,258,956. The total indebtedness of all of the towns, cities, boroughs and counties reported at the same time was $20,627,058 and the funded debt of the state, $3,240,200. For the year ending Sept. 30, 1895, the total revenue receipts from all sources was $1,997,434.42.

In 1895 the different lines of railway operating within the state had a mileage of 2,583, and the capital stock aggregated $90,008,363. The total value of the property of these corporations within the state is given as $167,079,458, and their gross earnings for the year, $35,206,110. The amount received as taxes from the railway lines was $803,995.37.

The number of children within the school age of 4 to 16 years was, for the school year of 1894–95, 170,589, and the total number enrolled in the public schools, 138,882. The number of public

STATE CAPITOL, HARTFORD, CONNECTICUT.

schools was 1,577; number of departments, 3,338; number of schoolhouses, 1,632; number of public high schools, 37; number of evening schools, 35. There were also 7 teachers' institutes and 3 normal schools. The value of the school property was $8,450,600. The number of teachers was given as 3,631, of whom almost 90 per cent were females. The expenditures for the maintenance of the school system amounted to $2,585,109. There are a number of collegiate schools and 3 colleges, the latter having an enrollment of 2,323 in 1893. The leading institution for advanced education is Yale University, situated at New Haven. (See YALE UNIVERSITY, in these Supplements.) Connecticut has 179 public libraries, of over 300 volumes each, with an aggregate of 707,159 volumes. In 1895 there were 210 newspapers published in the state.

The Storrs Agricultural College, in the town of Mansfield, Tolland County, was established in 1881 for the purpose of educating boys in the practical knowledge and business of agriculture. This college, in addition to state aid and a liberal endowment, is entitled to receive from the general government the amount of the annual donation under the act of 1890. Pending litigation on this donation, the institution has not suffered, as the state expenditure in aid of agricultural affairs is usually about $60,000, about one half of which goes to the Storrs school.

The national guard embraces about 2,800 officers and enlisted men, which includes a division of naval militia. The annual expenditure for the support of the guard approximates $200,000.

The cities and towns located on the sound have a large coasting-trade, and steamboats constantly ply between all important points and the cities

of New York and Philadelphia. Menhaden and oyster fisheries are conducted on an extensive scale, and yield a large revenue.

The state institutions include the state prison at Wethersfield, where about 550 convicts are confined; the Connecticut Hospital for the Insane, at Middletown, accommodating about 1,500 inmates; the Connecticut School for Boys, and the Connecticut Institute and Industrial School for the Blind, both model institutions; two schools for deaf mutes, one of which was the first established in the United States; and the Home for Dependent and Neglected Children, and the Connecticut School for Imbeciles. In addition, there are several state and general hospitals. The humane institutions of the state cost for maintenance during 1895, $236,000.

The most populous city is New Haven, which, according to the census of 1890, had 81,298 inhabitants. Hartford, the capital, had at the same time a population of 53,230; Bridgeport, 48,866; Waterbury, 28,646; Meriden, 21,652; New Britain, 19,007; Norwalk, 17,747; Danbury, 16,552; Norwich, 16,156; Stamford, 15,700; New London, 13,757; Ansonia, 10,342; Middletown, 9,013; Willimantic, 8,648; Rockville, 7,772; Bristol, 7,382; Winsted, 4,846.

The following is a list of the governors of Connecticut since the state organization in 1784, with the date of their inauguration:

Matthew Griswold, 1784; Samuel Huntington, 1786; Oliver Wolcott, 1796; Jonathan Trumbull, 1798; John Treadwell, 1809; Roger Griswold, 1811; John Cotton Smith, 1813; Oliver Wolcott, 1818; Gideon Jomlinson, 1827; John S. Peters, 1831; Henry W. Edwards, 1833; Samuel A. Foote, 1834; Henry W. Edwards, 1835; William W. Ellsworth, 1838; Chauncey F. Cleveland, 1842; Roger S. Baldwin, 1844; Isaac Toucey, 1846; Clark Bissell, 1847; Joseph Trumbull, 1849; Thomas H. Seymour, 1850; C. H. Pond (acting), 1853; Henry Dutton, 1854; William T. Minor, 1855; Alexander H. Holley, 1857; William A. Buckingham, 1858; Joseph R. Hawley, 1866; James E. English, 1867; Marshall Jewell, 1869; James E. English, 1870; Marshall Jewell, 1869; James E. English, 1870; Marshall Jewell, 1871; Charles R. Ingersoll, 1873; Richard D. Hubbard, 1877; Charles B. Andrews, 1879; Hobart B. Bigelow, 1881; Thomas M. Waller, 1883; Henry B. Harrison, 1885; Phineas C. Lounsbury, 1887; Morgan G. Bulkeley, 1889; Luzon B. Morris, 1893; O. Vincent Coffin, 1895–97; L. A. Cooke, 1897. See CONNECTICUT, Vol. VI, pp. 285–289.

CONNECTICUT RIVER, a river of New England, which rises in northern New Hampshire and flows in a southerly direction, separating Vermont from New Hampshire and crossing Massachusetts and Connecticut, when it enters Long Island Sound, at Saybrook. It is about 450 miles long, and is navigable for 50 miles for boats drawing eight feet of water. The river is noted for its shad-fishing; the alluvial valleys along its banks are famous for their rich growth of tobacco, and along the northern portions the scenery is picturesque and romantic. The Connecticut falls over 1,600 feet in its course.

CONNELLSVILLE, a railroad junction of Fayette County, southwestern Pennsylvania, situated on the Youghiogheny River, on the Baltimore and Ohio and the Pennsylvania railroads. It is the center of the coke-burning industry, nearly twenty thousand ovens being engaged in burning the Connellsville coke, which is considered the best coke obtainable. Bituminous coal is mined and paper and woolen goods manufactured. Population, not including the suburbs, where most of the coke-burners live, 5,629.

CONNERSVILLE, the capital of Fayette County, southeastern Indiana, situated on Whitewater River, on the Cincinnati, Cleveland and Dayton, the Cleveland, Cincinnati, Chicago and St. Louis and the Lake Erie and Western railroads. The city has a handsome courthouse and manufactories of woolens, furniture, blowers, etc. Population 1890, 4,548.

CONNOR, a small food-fish found in European seas and along the Atlantic coast of the United States. It is also known as gilt-head and golden-maid.

CONODONTS, small Palæozoic fossils found in Russia, which resemble the teeth of various fishes. They are probably the remains of worms or mollusks. See also ICHTHYOLOGY, Vol. XII, p. 666.

CONRAD, ROBERT TAYLOR, an American lawyer with a taste for authorship; born in Philadelphia, June 10, 1810; the son of a publisher, he was educated for the bar, but embarked in newspaper work, publishing the *Daily Commercial Intelligencer* in 1832; two years later, on account of impaired health, returned to the law; judge of the criminal sessions for the city and county of Philadelphia; in 1854 elected mayor of his native city; re-appointed to his judicial position in 1856; best known for his tragedy of *Aylmere*, in which Edwin Forrest took the part of Jack Cade. He died in Philadelphia, June 27, 1858.

CONRAD, TIMOTHY ABBOTT, an American palæontologist and conchologist; born in New Jersey, August, 1803. He commenced very early in life to investigate American palæontology and natural history, with special reference to the tertiary and cretaceous formations, and to existing specimens of mollusks. He was palæontologist of the New York geological survey from 1838 to 1841; reported on the scientific discoveries made on the Pacific railroad survey and also on the Mexican boundary survey. He defended the theory of periodical refrigeration, and evolved the theory that the Mississippi depression was the consequence of the upheaval of the Appalachians and the later elevation of the Rocky Mountain area. His works include *Fossil Shells of the Tertiary Formation of North America* (1832); *New Fresh-Water Shells of the United States* (1838); and *Palæontology of the State of New York* (1838–40). He died August 9, 1877.

CONSCIENCE. See ETHICS, Vol. VIII, pp. 574 et seq.

CONSCIENCE, Hendrik, a Belgian author; born in Antwerp, Dec. 3, 1812. From 1830 to 1836 he carried a musket in the Belgian army and composed patriotic songs. On the completion of his military service he with difficulty obtained a livelihood as a working gardener and as a village schoolmaster. In 1838 he identified himself with the Anti-French League, urging on his countrymen the adoption of the Flemish language in literature and conversation. His books, written in Flemish, became essentially popular, and were translated into most of the European languages. He was appointed instructor in Flemish to the children of the King of the Belgians, and the burghers of Antwerp honored him with a statue before his death. Among his novels may be mentioned *The Lion of Flanders: Jacob van Artevelde; Valentyn;* and *The Lost Glove.* Conscience died in Brussels, Sept. 12, 1883.

CONSCIOUSNESS. See Metaphysics, Vol. XVI, p. 92; and Physiology, Vol. XIX, pp. 20, 41. For different theories of consciousness, see Cartesianism, Vol. V, p. 142; Cousin, Vol. VI, p. 525; Hamilton, Vol. XI, p. 417; and Locke, Vol. XIV, p. 758.

CONSERVATION OF ENERGY. See Energy, Vol. VIII, p. 207.

CONSERVATORS OF THE PEACE are such officers as are vested with the power, and upon whom the duty is imposed, to preserve the peace. It is frequently provided by statute in the various states what officers shall be classed as conservators of the peace. Among the officers usually included in this class are judges, justices of the peace, sheriffs, constables, police-officers, the mayor of a city, and other officers who, by virtue of their offices, are charged with the duty of seeing that the public peace is kept. Such officers are clothed with the right to quell public disturbances and arrest any person guilty of a breach of the peace.

CONSHOHOCKEN, a town of Montgomery County, southeastern Pennsylvania, situated on the Schuylkill River, about three miles below Norristown, on the Pennsylvania and the Philadelphia and Reading railroads. It produces a variety of manufactures, including iron, cotton, shoddy and pottery. It is a well-built and growing town. Population 1890, 5,470.

CONSIDÉRANT, Victor Prosper, a French socialist; born Oct. 12, 1808, at Salins, in the department of Jura. After being educated at the Polytechnic School of Paris, he entered the army, which, however, he soon left, to promulgate the doctrines of the socialist Fourier. In 1849 Considérant was accused of high treason and compelled to flee from France. At San Antonio, Texas, he founded a socialist community, *La Réunion,* which flourished for a time. He returned to France in 1869, and wrote some works on socialism and labor, chief among which are *Principles of Socialism; Laws of Labor;* and *Theory of the Laws of Property.* Died in Paris, Dec. 27, 1893.

CONSIDERATION, in law, is the material cause which induces one party to enter into a contract with another. Considerations are classed as good, as those of natural love or affection, and the like; or valuable, as the performance of some act or the conferring of some benefit to or upon the party to whom the promise is made, or some third party at his request. A beneficial consideration, however slight the benefit, is sufficient to constitute a valuable consideration, and in the absence of fraud the extent of the benefit will not be inquired into as between the parties to the contract. Without a consideration, either good or valuable, a contract cannot exist. Such a promise is called, in law, a *nudum pactum,* and cannot be enforced. But, at common law, in a contract under seal, a consideration is conclusively presumed, and evidence will not be admitted to deny the consideration. This rule arises from the solemnity and fullness of assent which the act of attaching a seal imports. In many states this rule has been relaxed by custom, or abolished by statute, and the want or failure of consideration may be a good defense against a sealed instrument. A contract based upon a good consideration alone will be enforced as between the parties, if made in good faith, but is void as to a subsequent purchaser for value and without notice, or creditors who are not able to procure other property of the debtor from which to realize their demands. The rule is, that one must be just before he is generous, and when the title to property is passed without valuable consideration, or for a consideration wholly inadequate, creditors may have the transfer set aside or require the payment of the value of the property, so that their demands may be satisfied. But generally, such step can be taken only when the debt existed at the time the property was transferred. In contracts where the consideration is expressed, and in negotiable instruments, the consideration is presumed, but such presumption may be overcome by proof.

CONSISTORY, properly, any place of assembly. According to St. Cyprian, it was a most ancient custom of the church that the bishop should do nothing of importance without the meeting and advice of his clergy. The Roman Church early adopted this custom, and the priests and deacons of Rome, together with bishops of other cities who happened to be there, met with the pontiff, and with him decided all causes which were referred from every part of the world to this primary church. Similar was the rule of all metropolitan and cathedral churches, and from this practice sprang the cathedral chapter.

About the time of Constantine, the meeting of the pope with his advisers was given the name "consistory," and to-day it means "the solemn assembly or congregation which is made up of the pope and the college of cardinals gathered together as a senate in the Apostolic Palace." (See Cardinals, in these Supplements.) In olden times the consistory was the only tribunal in the papal court, and in it the Roman pontiffs used to decide all causes which now are examined and decided by the various congregations of cardinals.

(See CONGREGATIONS, ROMAN, in these Supplements.) Hence it met nearly every day, and heard, also, contentious causes. Later, much business was confided to commissions, and a number of permanent tribunals were instituted. Thus it was brought about that only important business was reserved for the consistory.

At the present time a consistory is either ordinary and secret, or solemn and public. Public consistories are called at the will of the pontiff, and in our times are celebrated but once or twice a year. What may be called a semipublic consistory is held when the canonization of a saint is in progress. To it all the bishops and archbishops, titular and residential, who may be in Rome at the time, are admitted. They may also vote. Such a consistory takes on the appearance of a general council, and in a manner represents the universal church.

The ordinary or secret consistories, according to former custom, were held twice a month, the usual time being Monday forenoon; but now the day and hour, as well as the consistory itself, depend entirely on the will of the pontiff. Notice is given the cardinals of the court, usually the day before the consistory. At the appointed time they are present, vested in cáppa magna, rochet and beretta, and sit on wooden benches. The pontiff is dressed in ordinary white cassock, rochet, mozetta and pontifical beretta, and occupies a seat somewhat elevated, and covered with a baldachino. In secret consistory the pope is accustomed to address the cardinals on the general condition of the church, or on some storm which has broken out against it in some part of the world. He also points out errors and dangerous doctrines, to the end that, these allocutions being published to the world later, bishops, priests and people belonging to the church may be warned against such errors. The business brought before the consistory is prepared usually by the consistorial congregation, but sometimes by the congregation for extraordinary ecclesiastical affairs. The decrees of the consistory are issued by the apostolic chancery. See CONSISTORY, Vol. VI, p. 292.

P. A. BAART.

CONSOLATO DEL MARE. See CONSULATE OF THE SEA, Vol. VI, p. 317; PRIZE, Vol. XIX, p. 766.

CONSTABLE. In the United States, constables are officers exercising duties similar to those of petty constables in England. They have, to a limited extent, the powers of conservators of the peace. The chief duty of constables is the service of writs in matters arising in justice of the peace courts. They are also authorized to arrest, without warrant, any one who may be guilty of a breach of the public peace in their presence, or whom they may reasonably suspect of felony. The jurisdiction of a constable is confined to the county in which he resides. The office is elective, one or more constables being elected from each township or district within the county. See CONSTABLE, Vol. VI, p. 294.

CONSTANS, JEAN ANTOINE ERNEST, a French politician; born at Béziers, France, May 3, 1833; was professor of law in Toulouse; Republican member of the Chamber of Deputies (1876); Minister of the Interior (1880–82); minister to China (1885–87); governor-general of Indo-China (1887–88); elected a Senator in 1889, and Minister of the Interior (1889–1892). The overthrow of the Boulangist infatuation was in a great measure due to his uncompromising vigor. Constans was one of the very few French statesmen unsoiled by the revelations in the Panama scandal.

CONSTANT, JEAN JOSEPH BENJAMIN, a French painter; born in Paris, June 10, 1845. He studied in the École des Beaux-Arts, and under Cabanel, and first exhibited at the Salon in 1869, with his *Hamlet and the King*, which was purchased by the French government. He is best known for his treatment of Eastern subjects. Among the best of his works are *Prisoners in Morocco* (1875); *Mahomet II* (1876); *The Harem* (1878); *The Favorite of the Emir* (1879); *The Day After a Victory in the Alhambra* (1882); and *The Vengeance of the Chérif* (1885). His *Justinian in Council* is in the New York Museum of Art. One of the most popular of contemporary French painters, he won many medals and the Legion of Honor, and figured at the Chicago World's Fair, 1893, where a series of decorated panels for the Sorbonne attracted considerable attention.

BENJAMIN CONSTANT.

CONSTANT–CURRENT MACHINES. See ELECTRICITY, §83, in these Supplements.

CONSTANTIA, a district of Cape Colony, South Africa, lying on the eastern and northeastern slopes of Table Mountain range, between Cape Town and Simons Bay. The district consists of three estates, High, Great and Little Constantia, which have long been famed for the quality of their wines.

CONSTANTINE, a village of St. Joseph County, southwestern Michigan, on the St. Joseph River, and on the Lake Shore and Michigan Southern railroad, 94 miles S.W. of Lansing. The river gives abundant water-power; it has a large peppermint-oil manufactory. Population 1895, 1,193.

CONSTANTINE, NIKOLAEVITCH, GRAND DUKE, the second son of the Emperor Nicholas I, and the brother of Alexander II, of Russia; born Sept. 21, 1827. During the Crimean War he commanded the Russian fleet of the Baltic. On the outbreak of the Polish insurrection in 1862, he held the office of viceroy of Poland for three months, and was appointed in 1865, and again in 1878, president of the Council of the Empire. In 1882 he was dismissed from this dignity and from the command of the fleet on the suspicion of having intrigued with the revolutionary party. He lost his reason in 1890, and died Jan. 25, 1892.

CONSTANT-POTENTIAL MACHINES. See ELECTRICITY, § 84, in these Supplements.

CONSTIPATION, an irregular and insufficient action of the bowels, due either to deficient secretion of fluids in the digestive organs, or to imperfect muscular action of the bowels, but usually to both these causes combined. The retention, within the organism, of matters which should regularly be evacuated as they are formed, and their consequent absorption into the blood and tissues of the body, often lead to a whole train of unpleasant symptoms; headache, or pain in other regions, irritability, lassitude and debility.

CONSTITUTIONAL UNION PARTY, THE. See UNITED STATES, Vol. XXIII, p. 772.

CONSTITUTION OF THE UNITED STATES. For its history and limitations, see UNITED STATES, Vol. XXIII, pp. 744 et seq. The text of the constitution of the United States of America is as follows:

PREAMBLE.

We, the people of the United States, in order to form a more perfect union, establish justice, insure domestic tranquillity, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this constitution for the United States of America.

ARTICLE I.

Sec. 1. All legislative powers herein granted shall be vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.

Sec. 2. 1. The House of Representatives shall be composed of members chosen every second year by the people of the several states, and the electors in each state shall have the qualifications requisite for electors of the most numerous branch of the state legislature.

2. No person shall be a Representative who shall not have attained to the age of twenty-five years, and been seven years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state in which he shall be chosen.

3. Representatives and direct taxes shall be apportioned among the several states which may be included within this Union, according to their respective numbers, which shall be determined by adding to the whole number of free persons, including those bound to service for a term of years, and, excluding Indians not taxed, three fifths of all other persons. The actual enumeration shall be made within three years after the first meeting of the Congress of the United States, and within every subsequent term of ten years, in such manner as they shall by law direct. The number of Representatives shall not exceed one for every thirty thousand, but each state shall have at least one Representative; and, until such enumeration shall be made, the state of New Hampshire shall be entitled to choose three, Massachusetts eight, Rhode Island and Providence Plantations one, Connecticut five, New York six, New Jersey four, Pennsylvania eight, Delaware one, Maryland six, Virginia ten, North Carolina five, South Carolina five, and Georgia three.

4. When vacancies happen in the representation from any state, the executive authority thereof shall issue writs of election to fill such vacancies.

5. The House of Representatives shall choose their Speaker and other officers; and shall have the sole power of impeachment.

Sec. 3. 1. The Senate of the United States shall be composed of two Senators from each state, chosen by the legislature thereof for six years; and each Senator shall have one vote.

2. Immediately after they shall be assembled in consequence of the first election, they shall be divided, as equally as may be, into three classes. The seats of the Senators of the first class shall be vacated at the expiration of the second year, of the second class at the expiration of the fourth year, and of the third class at the expiration of the sixth year, so that one third may be chosen every second year; and if vacancies happen by resignation or otherwise during the recess of the legislature of any state, the executive thereof may make temporary appointments until the next meeting of the legislature, which shall then fill such vacancies.

3. No person shall be a Senator who shall not have attained to the age of thirty years, and been nine years a citizen of the United States, and who shall not, when elected, be an inhabitant of that state for which he shall be chosen.

4. The Vice-President of the United States shall be President of the Senate, but shall have no vote, unless they be equally divided.

5. The Senate shall choose their other officers, and also a president *pro tempore*, in the absence of the Vice-President, or when he shall exercise the office of President of the United States.

6. The Senate shall have the sole power to try all impeachments. When sitting for that purpose, they shall be on oath or affirmation. When the President of the United States is tried, the chief justice shall preside; and no person shall be convicted without the concurrence of two thirds of the members present.

7. Judgment in cases of impeachment shall not extend further than to removal from office, and disqualification to hold and enjoy any office of honor, trust or profit, under the United States; but the party convicted shall, nevertheless, be liable and subject to indictment, trial, judgment and punishment according to law.

Sec. 4. 1. The times, places and manner of holding elections for Senators and Representatives shall be prescribed in each state by the legislature thereof; but the Congress may at any time, by law, make or alter such regulations, except as to the places of choosing Senators.

2. The Congress shall assemble at least once in every year, and such meeting shall be on the first Monday in December, unless they shall by law appoint a different day.

Sec. 5. 1. Each House shall be the judge of the elections, returns and qualifications of its own members, and a majority of each shall constitute a quorum to do business; but a smaller number may adjourn from day to day, and may be authorized to compel the attendance of absent members, in such manner and under such penalties, as each House may provide.

2. Each House may determine the rules of its proceedings, punish its members for disorderly behavior, and, with the concurrence of two thirds, expel a member.

3. Each House shall keep a journal of its proceedings, and, from time to time, publish the same, excepting such parts as may, in their judgment, require secrecy; and the yeas and nays of the members of either House, on any question, shall, at the desire of one fifth of those present, be entered on the journal.

4. Neither House, during the session of Congress, shall, without the consent of the other, adjourn for more than three days, nor to any other place than that in which the two Houses shall be sitting.

Sec. 6. 1. The Senators and Representatives shall receive a compensation for their services, to be ascertained by law, and paid out of the Treasury of the United States. They shall, in all cases, except treason, felony and breach of the peace, be privileged from arrest during their attendance at the session of their respective Houses, and in going to and returning from the same; and for any speech or debate in either House, they shall not be questioned in any other place.

2. No Senator or Representative shall, during the time for which he was elected, be appointed to any civil office under the authority of the United States, which shall have been created, or the emoluments whereof shall have been increased, during such time; and no person holding any office under the United States shall be a member of either House during his continuance in office.

Sec. 7. 1. All bills for raising revenue shall originate in the House of Representatives; but the Senate may propose or concur with amendments as on other bills.

2. Every bill which shall have passed the House of Representatives and the Senate shall, before it become

a law, be presented to the President of the United States; if he approve, he shall sign it, but if not, he shall return it, with his objections, to that House in which it shall have originated, who shall enter the objections at large on their journal, and proceed to reconsider it. If, after such reconsideration, two thirds of that House shall agree to pass the bill, it shall be sent, together with the objections, to the other House, by which it shall likewise be reconsidered, and if approved by two thirds of that House, it shall become a law. But in all such cases the votes of both Houses shall be determined by yeas and nays, and the names of the persons voting for and against the bill shall be entered on the journal of each House, respectively. If any bill shall not be returned by the President within ten days (Sundays excepted) after it shall have been presented to him, the same shall be a law, in like manner as if he had signed it, unless the Congress, by their adjournment, prevent its return, in which case it shall not be a law.

3. Every order, resolution or vote to which the concurrence of the Senate and House of Representatives may be necessary (except on a question of adjournment) shall be presented to the President of the United States, and before the same shall take effect shall be approved by him, or being disapproved by him, shall be repassed by two thirds of the Senate and House of Representatives, according to the rules and limitations prescribed in the case of a bill.

Sec. 8. The Congress shall have power,—

1. To lay and collect taxes, duties, imposts and excises, to pay the debts and provide for the common defense and general welfare of the United States; but all duties, imposts and excises shall be uniform throughout the United States;

2. To borrow money on the credit of the United States;

3. To regulate commerce with foreign nations, and among the several states, and with the Indian tribes;

4. To establish a uniform rule of naturalization, and uniform laws on the subject of bankruptcies, throughout the United States;

5. To coin money, regulate the value thereof, and of foreign coin, and fix the standard of weights and measures;

6. To provide for the punishment of counterfeiting the securities and current coin of the United States;

7. To establish post-offices and post roads;

8. To promote the progress of science and useful arts, by securing, for limited times, to authors and inventors, the exclusive right to their respective writings and discoveries;

9. To constitute tribunals inferior to the supreme court;

10. To define and punish piracies and felonies committed on the high seas, and offenses against the law of nations;

11. To declare war, grant letters of marque and reprisal, and make rules concerning captures on land and water;

12. To raise and support armies; but no appropriation of money to that use shall be for a longer term than two years;

13. To provide and maintain a navy;

14. To make rules for the government and regulation of the land and naval forces;

15. To provide for calling forth the militia to execute the laws of the Union, suppress insurrections and repel invasions;

16. To provide for organizing, arming and disciplining the militia, and for governing such part of them as may be employed in the service of the United States, reserving to the states respectively the appointment of the officers, and the authority of training the militia, according to the discipline prescribed by Congress;

17. To exercise exclusive legislation, in all cases whatsoever, over such district (not exceeding ten miles square) as may, by cession of particular states, and the acceptance of Congress, become the seat of the government of the United States, and to exercise like authority over all places, purchased by the consent of the legislature of the state in which the same shall be, for the erection of forts, magazines, arsenals, dockyards and other needful buildings; and

18. To make all laws which shall be necessary and proper for carrying into execution the foregoing powers, and all other powers vested by this constitution in the government of the United States, or in any department or officer thereof.

Sec. 9. 1. The migration or importation of such persons as any of the states now existing shall think proper to admit shall not be prohibited by the Congress prior to the year one thousand eight hundred and eight; but a tax or duty may be imposed on such importation, not exceeding ten dollars for each person.

2. The privilege of the writ of *habeas corpus* shall not be suspended, unless when, in cases of rebellion or invasion, the public safety may require it.

3. No bill of attainder or *ex post facto* law shall be passed.

4. No capitation or other direct tax shall be laid, unless in proportion to the census or enumeration hereinbefore directed to be taken.

5. No tax or duty shall be laid on articles exported from any state.

6. No preference shall be given by any regulation of commerce or revenue to the ports of one state over those of another; nor shall vessels bound to or from one state be obliged to enter clear or pay duties, in another.

7. No money shall be drawn from the Treasury but in consequence of appropriations made by law; and a regular statement and account of the receipts and expenditures of all public money shall be published from time to time.

8. No title of nobility shall be granted by the United States; and no person holding any office of profit or trust under them shall, without the consent of the Congress, accept of any present, emolument, office or title, of any kind whatever, from any king, prince or foreign state.

Sec. 10. 1. No state shall enter into any treaty, alliance or confederation; grant letters of marque and reprisal; coin money; emit bills of credit; make anything but gold and silver coin a tender in payment of debts; pass any bill of attainder, *ex post facto* law, or law impairing the obligation of contracts, or grant any title of nobility.

2. No state shall, without the consent of the Congress, lay any imposts or duties on imports or exports, except what may be absolutely necessary for executing its inspection laws; and the net produce of all duties and imposts laid by any state on imports or exports, shall be for the use of the Treasury of the United States; and all such laws shall be subject to the revision and control of the Congress.

3. No state shall, without the consent of Congress, lay any duty of tonnage, keep troops or ships of war in time of peace, enter into any agreement or compact with another state, or with a foreign power, or engage in war, unless actually invaded, or in such imminent danger as will not admit of delay.

ARTICLE II.

Sec. 1. 1. The executive power shall be vested in a President of the United States of America. He shall hold his office during the term of four years, and, together with the Vice-President, chosen for the same term, be elected as follows:

2. Each state shall appoint, in such manner as the legislature thereof may direct, a number of electors, equal to the whole number of Senators and Representatives to which the state may be entitled in the Congress; but no Senator or Representative, or person holding an office of trust or profit under the United States, shall be appointed an elector.

3. The electors shall meet in their respective states and vote by ballot for two persons, of whom one, at least, shall not be an inhabitant of the same state with themselves. And they shall make a list of all the persons voted for, and of the number of votes for each; which list they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the president of the Senate. The president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted. The person having the greatest number of

votes shall be the President, if such number be a majority of the whole number of electors appointed; and if there be more than one who have such majority, and have an equal number of votes, then the House of Representatives shall immediately choose, by ballot, one of them for President; and if no person have a majority, then, from the five highest on the list, the said House shall, in like manner, choose the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the states, and a majority of all the states shall be necessary to a choice. In every case, after the choice of the President, the person having the greatest number of votes of the electors shall be the Vice-President. But if there should remain two or more who have equal votes, the Senate shall choose from them, by ballot, the Vice-President. [This clause is annulled by Article XII of the Amendments.]

4. The Congress may determine the time of choosing the electors, and the day on which they shall give their votes; which day shall be the same throughout the United States.

5. No person, except a natural-born citizen, or a citizen of the United States at the time of the adoption of this Constitution, shall be eligible to the office of President; neither shall any person be eligible to that office who shall not have attained to the age of thirty-five years, and been fourteen years a resident within the United States.

6. In case of the removal of the President from office, or of his death, resignation or inability to discharge the powers and duties of the said office, the same shall devolve on the Vice-President, and the Congress may by law provide for the case of removal, death, resignation or inability, both of the President and Vice-President, declaring what officer shall then act as President, and such officer shall act accordingly, until the disability be removed, or a President shall be elected.

7. The President shall, at stated times, receive for his services a compensation, which shall neither be increased nor diminished during the period for which he shall have been elected, and he shall not receive, within that period, any other emolument from the United States, or any of them.

8. Before he enter on the execution of his office, he shall take the following oath or affirmation:

"I do solemnly swear (or affirm) that I will faithfully execute the office of President of the United States, and will, to the best of my ability, preserve, protect and defend the Constitution of the United States."

Sec. 2. 1. The President shall be commander-in-chief of the army and navy of the United States, and of the militia of the several states, when called into the actual service of the United States; he may require the opinion, in writing, of the principal officer in each of the executive departments upon any subject relating to the duties of their respective offices, and he shall have power to grant reprieves and pardons for offenses against the United States, except in cases of impeachment.

2. He shall have power, by and with the advice and consent of the Senate, to make treaties, provided two thirds of the Senators present concur; and he shall nominate, and, by and with the advice and consent of the Senate, shall appoint ambassadors, other public ministers and consuls, judges of the supreme court, and all other officers of the United States whose appointments are not herein otherwise provided for, and which shall be established by law; but the Congress may by law vest the appointment of such inferior officers as they think proper in the President alone, in the courts of law, or in the heads of departments.

3. The President shall have power to fill up all vacancies that may happen during the recess of the Senate, by granting commissions which shall expire at the end of their next session.

Sec. 3. 1. He shall, from time to time, give to the Congress information of the state of the Union, and recommend to their consideration such measures as he shall judge necessary and expedient; he may, on extraordinary occasions, convene both Houses, or either of them, and in case of disagreement between them with respect to the time of adjournment, he may adjourn them to such time as he shall think proper; he shall receive ambassadors and other public ministers; he shall take care that the laws be faithfully executed, and shall commission all the officers of the United States.

Sec. 4. 1. The President, Vice-President and all civil officers of the United States shall be removed from office on impeachment for and conviction of treason, bribery, or other high crimes and misdemeanors.

ARTICLE III.

Sec. 1. The judicial power of the United States shall be vested in one supreme court, and in such inferior courts as the Congress may, from time to time, ordain and establish. The judges, both of the supreme and inferior courts, shall hold their offices during good behavior, and shall, at stated times, receive for their services a compensation which shall not be diminished during their continuance in office.

Sec. 2. 1. The judicial power shall extend to all cases, in law and equity, arising under this constitution, the laws of the United States, and treaties made, or which shall be made, under their authority; to all cases affecting ambassadors, other public ministers and consuls; to all cases of admiralty and maritime jurisdiction; to controversies to which the United States shall be a party; to controversies between two or more states, between a state and citizens of another state, between citizens of different states, between citizens of the same state claiming lands under grants of different states, and between a state, or the citizens thereof, and foreign states, citizens or subjects.

2. In all cases affecting ambassadors, other public ministers and consuls, and those in which a state shall be a party, the supreme court shall have original jurisdiction. In all the other cases before mentioned, the supreme court shall have appellate jurisdiction, both as to law and fact, with such exceptions and under such regulations as the Congress shall make.

3. The trial of all crimes, except in cases of impeachment, shall be by jury; and such trial shall be held in the state where the said crimes shall have been committed; but when not committed within any State, the trial shall be at such place or places as the Congress may by law have directed.

Sec. 3. 1. Treason against the United States shall consist only in levying war against them, or in adhering to their enemies, giving them aid and comfort. No person shall be convicted of treason unless on the testimony of two witnesses to the same overt act, or on confession in open court.

2. The Congress shall have power to declare the punishment of treason, but no attainder of treason shall work corruption of blood or forfeiture, except during the life of the person attainted.

ARTICLE IV.

Sec. 1. Full faith and credit shall be given in each state to the public acts, records and judicial proceedings of every other state. And the Congress may, by general laws, prescribe the manner in which such acts, records and proceedings shall be proved, and the effect thereof.

Sec. 2. 1. The citizens of each state shall be entitled to all privileges and immunities of citizens in the several states.

2. A person charged in any state with treason, felony or other crime, who shall flee from justice, and be found in another state, shall, on demand of the executive authority of the state from which he fled, be delivered up, to be removed to the state having jurisdiction of the crime.

3. No person held to service or labor in one state, under the laws thereof, escaping into another, shall, in consequence of any law or regulation therein, be discharged from such service or labor, but shall be delivered up on claim of the party to whom such service or labor may be due.

Sec. 3. 1. New states may be admitted by the Congress into this Union; but no new state shall be formed or erected within the jurisdiction of any other state, nor any state be formed by the junction of two or more states

or parts of states, without the consent of the legislatures of the states concerned as well as of the Congress.

2. The Congress shall have power to dispose of and make all needful rules and regulations respecting the territory or other property belonging to the United States; and nothing in this constitution shall be so construed as to prejudice any claims of the United States, or of any particular state.

Sec. 4. The United States shall guarantee to every state in this Union a republican form of government, and shall protect each of them against invasion; and on application of the legislature, or of the executive (when the legislature cannot be convened), against domestic violence.

ARTICLE V.

1. The Congress, whenever two thirds of both houses shall deem it necessary, shall propose amendments to this constitution, or, on the application of the legislatures of two thirds of the several states, shall call a convention for proposing amendments, which, in either case, shall be valid, to all intents and purposes, as part of this constitution, when ratified by the legislatures of three fourths of the several states, or by conventions in three fourths thereof, as the one or the other mode of ratification may be proposed by the Congress; *provided*, that no amendment which may be made prior to the year one thousand eight hundred and eight shall, in any manner, affect the first and fourth clauses in the ninth section of the first article; and that no state, without its consent, shall be deprived of its equal suffrage in the Senate.

ARTICLE VI.

1. All debts contracted and engagements entered into before the adoption of this constitution shall be as valid against the United States under this constitution as under the confederation.

2. This constitution, and the laws of the United States which shall be made in pursuance thereof, and all treaties made or which shall be made under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, anything in the constitution or laws of any state to the contrary notwithstanding.

3. The Senators and Representatives before mentioned, and the members of the several state legislatures, and all executive and judicial officers, both of the United States and of the several states, shall be bound, by oath or affirmation, to support this constitution; but no religious test shall ever be required as a qualification to any office or public trust under the United States.

ARTICLE VII.

1. The ratification of the conventions of nine states shall be sufficient for the establishment of this constitution between the states so ratifying the same.

Done in convention, by the unanimous consent of the states present, the seventeenth day of September, in the year of our Lord one thousand seven hundred and eighty-seven, and of the independence of the United States of America, the twelfth. In witness whereof, we have hereunto subscribed our names.

GEORGE WASHINGTON,
President, and Deputy from Virginia.

New Hampshire.
JOHN LANGDON.
NICHOLAS GILMAN.

Massachusetts.
NATHANIEL GORHAM.
RUFUS KING.

Connecticut.
WILLIAM SAMUEL JOHNSON.
ROGER SHERMAN.

New York.
ALEXANDER HAMILTON.

New Jersey.
WILLIAM LIVINGSTON.
DAVID BREARLEY.
WILLIAM PATERSON.
JONATHAN DAYTON.

Pennsylvania.
BENJAMIN FRANKLIN.
ROBERT MORRIS.
THOMAS FITZSIMMONS.
JAMES WILSON.
THOMAS MIFFLIN.
GEORGE CLYMER.
JARED INGERSOLL.
GOUVERNEUR MORRIS.

Delaware.
GEORGE READ.
GUNNING BEDFORD, JR.
JOHN DICKINSON.
RICHARD BASSETT.
JACOB BROOM.

Maryland.
JAMES MCHENRY.
DANIEL OF ST. THOMAS JENIFER.
DANIEL CARROLL.

Virginia.
JOHN BLAIR.
JAMES MADISON, JR.

North Carolina.
WILLIAM BLOUNT.
RICHARD DOBBS SPAIGHT.
HUGH WILLIAMSON.

South Carolina.
JOHN RUTLEDGE.
CHARLES PINCKNEY.
PIERCE BUTLER.
CHARLES COTESWORTH PINCKNEY.

Georgia.
WILLIAM FEW.
ABRAHAM BALDWIN.

Attest: WILLIAM JACKSON, *Secretary.*

The constitution was ratified by the conventions of the several states, as follows:

Delaware, Dec. 7, 1787; Pennsylvania, Dec. 12, 1787; New Jersey, Dec. 18, 1787; Georgia, Jan. 2, 1788; Connecticut, Jan. 9, 1788; Massachusetts, Feb. 6, 1788; Maryland, April 28, 1788; South Carolina, May 23, 1788; New Hampshire, June 21, 1788; Virginia, June 26, 1788; New York, July 26, 1788; North Carolina, Nov. 21, 1789; Rhode Island, May 29, 1790.

The following are the articles in addition to and in amendment of the constitution of the United States of America, proposed by Congress, and ratified by the legislatures of the several states, pursuant to the fifth article of the original constitution.

[During the session of the First Congress of the United States in 1789 the first ten of the amendments were proposed. They were afterward ratified by the states in 1791. The Eleventh Amendment was proposed by the Third Congress in 1794 and ratified in 1798. The Twelfth Amendment was proposed by the Eighth Congress in 1803 and ratified in 1804. The Thirteenth Amendment was proposed by the Thirty-Eighth Congress in 1865 and ratified the same year. The Fourteenth Amendment was proposed by the Thirty-Ninth Congress in 1866 and ratified in 1868. The Fifteenth Amendment was proposed by the Fortieth Congress in 1869 and ratified in 1870.]

ARTICLE I.

Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for redress of grievances.

ARTICLE II.

A well-regulated militia being necessary to the security of a free state, the right of the people to keep and bear arms shall not be infringed.

ARTICLE III.

No soldier shall, in time of peace, be quartered in any house without the consent of the owner, nor in time of war, but in a manner to be prescribed by law.

ARTICLE IV.

The right of the people to be secure in their persons, houses, papers and effects against unreasonable searches and seizures shall not be violated; and no warrants shall issue, but upon probable cause, supported by oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized.

ARTICLE V.

No person shall be held to answer for a capital or otherwise infamous crime, unless on a presentment or indictment of a grand jury, except in cases arising in the land or naval forces, or in the militia, when in actual service in time of war or public danger; nor shall any person be subject for the same offense to be twice put in jeopardy of life or limb; nor shall be compelled, in any criminal case, to be a witness against himself; nor be deprived of life, liberty or property without due process of law; nor shall private property be taken for public use without just compensation.

ARTICLE VI.

In all criminal prosecutions the accused shall enjoy the right to a speedy and public trial, by an impartial jury of

the state and district wherein the crime shall have been committed, which district shall have been previously ascertained by law; and to be informed of the nature and cause of the accusation; to be confronted with the witnesses against him; to have compulsory process for obtaining witnesses in his favor; and to have the assistance of counsel for his defense.

ARTICLE VII.

In suits at common law, where the value in controversy shall exceed twenty dollars, the right of trial by jury shall be preserved; and no fact tried by a jury shall be otherwise re-examined in any court of the United States than according to the rules of the common law.

ARTICLE VIII.

Excessive bail shall not be required, nor excessive fines imposed, nor cruel and unusual punishments inflicted.

ARTICLE IX.

The enumeration, in the constitution, of certain rights shall not be construed to deny or disparage others retained by the people.

ARTICLE X.

The powers not delegated to the United States by the constitution, nor prohibited by it to the states, are reserved to the states respectively, or to the people.

ARTICLE XI.

The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another state, or by citizens or subjects of any foreign state.

ARTICLE XII.

The electors shall meet in their respective states, and vote by ballot for President and Vice-President, one of whom, at least, shall not be an inhabitant of the same state with themselves; they shall name in their ballots the person voted for as President, and in distinct ballots the person voted for as Vice-President, and they shall make distinct lists of all persons voted for as President, and of all persons voted for as Vice-President, and of the number of votes for each, which lists they shall sign and certify, and transmit, sealed, to the seat of the government of the United States, directed to the president of the Senate; the president of the Senate shall, in the presence of the Senate and House of Representatives, open all the certificates, and the votes shall then be counted; the person having the greatest number of votes for President shall be the President, if such number be a majority of the whole number of electors appointed; and if no person have such a majority, then, from the persons having the highest numbers, not exceeding three, on the list of those voted for as President, the House of Representatives shall choose immediately, by ballot, the President. But in choosing the President, the votes shall be taken by states, the representation from each state having one vote; a quorum for this purpose shall consist of a member or members from two thirds of the states, and a majority of all the states shall be necessary to a choice. And if the House of Representatives shall not choose a President, whenever the right of choice shall devolve upon them, before the fourth day of March next following, then the Vice-President shall act as President, as in case of the death, or other constitutional disability, of the President. The person having the greatest number of votes as Vice-President shall be the Vice-President, if such number be a majority of the whole number of electors appointed; and if no person have a majority, then, from the two highest numbers on the list, the Senate shall choose the Vice-President; a quorum for the purpose shall consist of two thirds of the whole number of Senators, and a majority of the whole number shall be necessary to a choice. But no person constitutionally ineligible to the office of President shall be eligible to that of Vice-President of the United States.

ARTICLE XIII.

Sec. 1. Neither slavery nor involuntary servitude, except as a punishment for crime, whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction.

Sec. 2. Congress shall have power to enforce this article by appropriate legislation.

ARTICLE XIV.

Sec. 1. All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States, and of the state wherein they reside. No state shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any state deprive any person of life, liberty or property without due process of law, nor deny to any person within its jurisdiction the equal protection of the laws.

Sec. 2. Representatives shall be apportioned among the several states according to their respective numbers, counting the whole number of persons in each state, excluding Indians not taxed. But when the right to vote at any election for the choice of electors for President and Vice-President of the United States, Representatives in Congress, the executive and judicial officers of a state, or the members of the legislature thereof, is denied to any of the male inhabitants of such state, being twenty-one years of age, and citizens of the United States, or in any way abridged, except for participation in rebellion or other crime, the basis of representation therein shall be reduced in the proportion which the number of such male citizens shall bear to the whole number of male citizens twenty-one years of age in such state.

Sec. 3. No person shall be a Senator or Representative in Congress, or elector of President and Vice-President, or hold any office, civil or military, under the United States, or under any state, who, having previously taken an oath as a member of Congress, or as an officer of the United States, or as a member of any state legislature, or as an executive or judicial officer of any state, to support the Constitution of the United States, shall have engaged in insurrection or rebellion against the same, or given aid or comfort to the enemies thereof. But Congress may, by a vote of two thirds of each House, remove such disability.

Sec. 4. The validity of the public debt of the United States, authorized by law, including debts incurred for payment of pensions and bounties for services in suppressing insurrection or rebellion, shall not be questioned. But neither the United States nor any state shall assume or pay any debt or obligation incurred in aid of insurrection or rebellion against the United States, or any claim for the loss or emancipation of any slave, but all such debts, obligations and claims shall be held illegal and void.

Sec. 5. The Congress shall have power to enforce, by appropriate legislation, the provisions of this article.

ARTICLE XV.

Sec. 1. The right of citizens of the United States to vote shall not be denied or abridged by the United States, or by any state, on account of race, color or previous condition of servitude.

Sec. 2. The Congress shall have power to enforce this article by appropriate legislation.

CONSTITUTIONS OF CLARENDON. See CLARENDON, CONSTITUTIONS OF, in these Supplements.

CONSUBSTANTIATION (Lat. *con*, together; and *substantia*, being substance); a name often given to the Lutheran doctrine of the real presence of Christ in the Lord's Supper. The doctrine is, that the body and blood of Christ are really present in and under the bread and wine, so that the communicant partakes of them, while yet the bread and wine are not changed into them, and while no new substance is formed by a union of the bread and wine with them. The name has never been used by the Lutherans to designate their doctrine; on the contrary, they repudiate it, on the ground that it more naturally designates the doctrine held by John of Paris, that there is a substantial conjunction of the bread and wine and the body and blood. Those who ap-

ply the name to the Lutheran doctrine do not use it in this sense, however, and do not misunderstand the position of the Lutherans; they use it simply for want of a better term. It seems to them well adapted to distinguish the Lutheran doctrine from that of the Roman Catholic Church called "transubstantiation." See LUTHER, Vol. XV, p. 81.

F. JOHNSON.

CONSUETUDINARY OR CUSTOMARY LAW, an unwritten law established by usage, and derived by immemorial custom from remote antiquity. When universal, it is called common law; when particular, it is called custom, in a narrower sense, as the custom of a trade, or of a district.

CONSUMPTION. See PHTHISIS, Vol. XVIII, p. 855; and see also PATHOLOGY, Vol. XVIII, pp. 405, 406.

CONTARINI, the name of a noble family in Venice, one of the twelve that elected the first doge. Between 1043 and 1674 eight doges were furnished by this family, which also counted among its members four patriarchs and a large number of generals, statesmen, artists, poets and scholars.

CONTINENTAL SYSTEM, Napoleon's fatuous project for ruining England by ruining her trade. He first announced this plan on Feb. 9, 1801, and on Nov. 21, 1806, issued the notorious Berlin Decree. By its five terms,—1. The British Isles were declared to be in a state of blockade; 2. All commerce and correspondence with Great Britain were forbidden; 3. Every Englishman found on the continent of Europe was declared a prisoner of war; 4. All British goods and merchandise were to be considered lawful prizes; and 5. All vessels coming from England or an English colony were to be refused admission into any continental harbor. The folly of boycotting England was this: As Great Britain was the best customer of these continental nations, they ruined their own commerce at the Corsican despot's bidding, and to gratify his personal malice and revenge. Austria acceded to the system, Nov. 24, 1807; Sweden, Sept. 17, 1809; and the petty Roman states, in December, 1809. Russia withdrew from the alliance in 1810, though Napoleon tried to enforce the system in 1812, but after the retreat from Moscow it was abandoned wholly.

CONTINGENT REMAINDER, an estate in expectancy in law. See REMAINDER, Vol. XX, p. 372.

CONTINUITY OF THE GERM-PLASM. See HEREDITY, in these Supplements.

CONTINUITY, LAW OF. See PSYCHOLOGY, Vol. XX, pp. 42, 45.

CONTINUOUS POTENTIAL DIFFERENCE. See ELECTRICITY, Vol. VIII, p. 25; and see also ELECTRICITY, § 39, in these Supplements.

CONTRAYERVA ("counter-poison"), an aromatic bitterish root of different species of *Dorstenia*, of the family *Urticaceæ;* used as a stimulant and tonic. *Dorstenia* is a tropical American genus closely related to the mulberries, and is of interest as showing a transitional form to the fig in its flat, open inflorescence.

CONTRIBUTION, in law, is the payment of the proportionate share of a loss by each or any one of several persons, who were liable in common in some transaction, to such one or more of the others who, being also liable, may have been compelled to discharge the entire liability. When one person has been compelled to discharge a liability with which he was charged in common with others, he has a right to contribution, from each of the others, of his proportionate share of such loss, and may bring suit to enforce such right. The occasion for exercising this right frequently arises between sureties, where one of several sureties has been compelled to make good the default of the principal, or more than his share of such loss, in which case contribution can be enforced. The right of contribution also exists in favor of one partner who has borne more than his share of the losses or expenses of the partnership, as against the other members of the firm. In the case of joint owners of property, or tenants in common, contribution will be enforced where one has paid more than his share of the expenses for the common benefit. Suits to compel contribution are generally brought in chancery, especially when in partnership matters.

CONVENTIONAL, IN ART. See DRAWING, Vol. VII, pp. 447, 448.

CONVENTION PARLIAMENT, a name given to two English Parliaments. The first, in 1660, after the Restoration, consisted of both houses, was not called together by the sovereign, but was merely convened by General Monk. It passed an act restoring the ancient general constitution of kings, lords and commons, and was legalized by Charles II. It was the most bloodthirsty and infamous of all the Parliaments in the annals of English history, even condemning the immortal John Milton to death. It first met April 25, 1660, and dissolved Dec. 29, 1660. The second Convention Parliament met Jan. 22, 1689, and dissolved Jan. 29, 1691. It conferred the crown on William and Mary.

CONVERSION, IN LAW. See TROVER, Vol. XXIII, p. 589.

CONVEYANCE is a general term embodying all the various methods for the transfer of the title to real estate. The word is used to indicate the act and also the instrument by which title is passed. A deed, mortgage, release, lease, will or any other instrument by which any interest in real property is transferred is a conveyance. The expense of the conveyance is usually to be paid by the purchaser, unless there is an express agreement to the contrary.

CONVEYANCING is the science of the transfer of title to real estate from one to another. It includes, also, the examination of the title of the grantor.

The question of simplifying the system of conveyancing has been largely discussed throughout the United States during the past few years,

and in some states legislation has been attempted with the view to reach that result. The delay and expense necessary to the transfer of real estate has become exceedingly vexatious since the chain of title to property has become more drawn out and involved, and especially is this true in large cities, where many transfers occur, and where frequently the proper care is not given by those who examine the abstract of title. The most feasible system which has yet been introduced into the United States with a view to avoid these difficulties is that familiarly known as the "Torrens Land Title System," and it has met with much favor in many states within the last few years. The essential feature of this system is the registration of titles. The public registrar, when once the title has been examined by public examiners appointed for that purpose, and found to be valid, places the description of the property on the registration books, and issues a certificate of ownership to the party entitled thereto. All mortgages or valid liens must be noted on the register and on the certificate, and no claim can defeat the title as shown on the register. Abstracts of title are practically avoided, as all valid claims against the property are shown on the register. Clouds cannot be placed upon the title by means of some other transfer made under an error in description; because only the person legally authorized to make a conveyance can interfere with the title, and before he can have the title transferred he must produce his certificate, which will be canceled, and another issued to the party entitled thereto, containing the notation of all liens and mortgages. No judgment can become a lien upon real estate except by filing a transcript thereof and having same noted on the page of the register devoted to that tract. Thus the difficulty of having a judgment recorded against the land of every person having the same name as the one against whom the judgment is rendered is avoided. The chief virtue of this system is the simplicity and absoluteness of the title which is given. The certificate of title is absolute, and subject only to the conditions noted upon it. If the register shows a mortgage canceled, it is not necessary to examine the instrument to see if it is in proper form, as the certificate which shows that it is canceled is absolute, and the duty is upon the registrar alone to see that the release is in proper form. The title is kept clear by this method continually, and an examination of the page of the register containing the title of the last owner is sufficient to obtain all information required to pass safely upon the title. The registrar does not enter an instrument in the register unless it is properly drawn, and the party executing the instrument can legally do what he thereby undertakes. The fact of its entry makes an instrumeut absolute in effect.

This system of land titles was first introduced in 1858 by Sir Robert Torrens in South Australia, and has been in operation continually since that time. It was adopted in Great Britain in 1875, and in various provinces of British Columbia between 1870 and 1888. Practically, the same system is now in operation in the German Empire. Bohemia has had a system of land titles quite similar in many respects for the last two hundred years, and Hamburg for one hundred years. Japan has also had a similar system for many years. The first state in the United States to adopt the Torrens system was Illinois, in which state a law was enacted, June 13, 1895, but it was declared unconstitutional in November, 1896, for vesting the registrar with judicial functions. It was adopted in the state of Ohio early in 1896. Many other states have given much consideration to the subject. In Massachusetts, New York and Kentucky, bills have been introduced providing for the Torrens system, but for various reasons have not been adopted. The law was declared unconstitutional by the Illinois Supreme Court, Oct. 9, 1896.

Another method which has been tried in various portions of the United States is that of the guaranty of titles by private individuals or corporations organized for that purpose. A number of title guaranty companies have been organized, which, upon application of the owner, examine the title to real estate, and if found to be good, these companies will issue a written guaranty of the title somewhat in the nature of a policy of insurance. These policies are issued for a consideration, and have been a source of some benefit. The difficulties which stand in the way of good titles, however, are not effected by these companies, and the benefit is only extended to the particular title which they guarantee.

CONVOLVULUS, a genus of the family *Convolvulaceæ*, to which it has given its name. The species commonly are called bindweeds, and are related closely to the morning glory (*Ipomœa*), from which it differs chiefly in its two linear stigmas. The funnel-form flowers are colored variously as in the morning glory, and the plants are spreading or twining. There are no native species of *Convolvulus* proper in the United States, but the European *C. arvensis* has become a naturalized weed. The old genus *Calystegia*, however, is now included in *Convolvulus*, characterized by its large leafy bracts surrounding the calyx, and is represented in the United States by several species.

CONVULSIONISTS, a term applied in 1632 to the persons afflicted by the convulsion epidemic which broke out in the nunneries about Bordeaux, France, especially in the Ursuline convent of Loudun. In 1686 the French refugees, driven from house and home by the infamous dragonnade expeditions, were affected by a similar epidemic. In 1882 the term was used in France to denote an extreme democrat or radical, whose platform was the convulsion or plucking up the established order of all things by the roots.

CONVULSIONNAIRES, a term given to certain fanatical Jansenists of France, who met in St. Medard's churchyard, in the suburbs of Paris, where was the tomb of a certain Abbé François de

Paris, who had died in 1727, where numberless miracles were alleged to have been done. There these fanatics threw themselves into the most violent contortions. Louis XV ordered them to be imprisoned in 1733, but was unable to stamp out the fervor entirely.

CONVULSIONS. See PATHOLOGY, Vol. XVIII, p. 391.

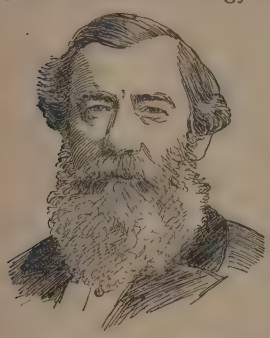
CONWAY, a town and the capital of Faulkner County, northern central Arkansas, on the St. Louis, Iron Mountain and Southern railroad, 30 miles N.W. of Little Rock. It is the seat of Hendrix (Methodist) College and a Baptist college for girls. It has a large cotton trade. Population 1890, 1,207.

CONWAY, a town and a river in North Wales. See CONWAY, Vol. VI, p. 330; CARNARVON, Vol. V, p. 119.

CONWAY, a village and the capital of Horry County, eastern South Carolina, about 100 miles N.N.E. of Charleston on the Waccamaw River, at the head of navigation, and a terminus of the Atlantic Coast Line railroad. It has several lumber-mills and a depot for naval supplies. Population 1896, 700.

CONWAY, HUGH, pseudonym of FARGUS, FREDERICK JOHN; q.v., in these Supplements.

CONWAY, MONCURE DANIEL, an American author and clergyman; born at Middleton, in Stafford county, Virginia, March 17, 1832; educated at Dickinson College, Carlisle, Pennsylvania, and studied law, but abandoned it and entered the Methodist ministry, preaching in various circuits of Virginia. As a law student he had held extreme Southern views and had expressed himself in articles in the Richmond *Examiner*. Coming under the influence of Emerson and the radical opponents of slavery, his political beliefs changed with his religious creed. He entered the Divinity School at Cambridge, and on graduation essayed to preach Unitarian doctrine in his native state. His antislavery sentiments and the assistance he gave to an escaping slave raised a hornet's nest of threats against his life. The same causes led to his dismissal from a Unitarian church in Washington, District of Columbia. In 1857 he became a pastor in Cincinnati, and afterward, for a time, edited the Boston *Commonwealth*. In 1863 he visited England for the purpose of writing and lecturing in the interests of the antislavery party. Here the trustees of the ultra-liberal South Place Chapel, in London, secured his services, and here he preached from 1863 until 1884, when he returned to the United States. His principal works are *Tracts for To-Day* (1858); *Testimonies Concerning Slavery* (1865); *Idols and Ideals* (1877); *Demonology and Devil Lore* (1879); *The Wandering Jew* (1881); *The Sacred Anthology* (1873); *Washington's Unpublished Agricultural Letters* (1889); *Life of Nathaniel Hawthorne* (1890); *Life of Thomas Paine* (2 vols., 1892). In 1892 Mr. Conway returned to his London pulpit.



MONCURE D. CONWAY.

CONWAY, THOMAS, COUNT DE, an Irish soldier of fortune; born in Ireland, Feb. 27, 1733. He distinguished himself in the French army, and in 1777 came to the United States and offered his services to Congress. He was at the battles of Brandywine and Germantown as a brigadier-general. He was made major-general, Dec. 14, 1777, but in March of the following year resigned. Subsequently he returned to France and was appointed governor of Pondicherry and the French settlements in Hindustan. In 1792 he took charge of the royalist army in the south of France. Count Conway is chiefly known in American history as the leader of "Conway's cabal," a conspiracy to deprive Washington of the command of the army; as to which, see WASHINGTON, Vol. XXIV, p. 389; UNITED STATES, Vol. XXII, p. 742, § 84. He died about 1800.

CONY, a rabbit, especially the European rabbit (*Lepus cuniculus*). See RABBIT, Vol. XX, p. 192. The cony of the Old Testament is supposed to be the Syrian hyrax, or daman (*Hyrax Syriacus*). See HYRAX, Vol. XII, p. 599.

CONYBEARE, WILLIAM JOHN, REV., son of WILLIAM DANIEL CONYBEARE, the eminent geologist; q.v., Vol. VI, p. 330; born Aug. 1, 1815; died at Weybridge in 1857. He was educated at Westminster and Trinity College, Cambridge. In 1842 he was appointed principal of the Liverpool Collegiate Institution, which position he was subsequently compelled by ill health to exchange for the vicarage of Axminster. He was joint author, with Dean Howson, of a widely known *Life and Epistles of St. Paul* (1851).

CONYERS, a town and the capital of Rockdale County, northwestern central Georgia, on the Georgia railroad, 30 miles E.S.E. of Atlanta. Cotton-raising in the region and milling are the chief industries. Population 1890, 1,349.

COOK, ALBERT STANBURROUGH, an American scholar and educator; born at Montville, New Jersey, March 6, 1853; educated at Rutgers College, at the universities of Göttingen and Leipsic, and at London and Jena; was professor of English in the University of California, 1882–89; Carew lecturer at Hartford Theological Seminary, 1890–91; professor of English language and literature in Yale University, 1889. In addition to numerous contributions to literary and scientific publications, Professor Cook has issued an edition of Siever's *Old English Grammar* (1885); *Judith, an Old English Epic Fragment* (1889).

COOK, CLARENCE CHATHAM, an American journalist; born at Dorchester, Massachusetts, Sept. 8, 1828; educated at Harvard and studied architecture; was for some years a teacher. The success of a series of articles on American art, contributed to the New York *Tribune*, and prompted by the pictures at the New York Sanitary Fair of

1863, secured him the position of art critic on the *Tribune* for six years. In 1869 he was sent as correspondent to Paris, but resigned when the Germans crossed the Rhine, passed some time in Italy, and returned to America and the New York *Tribune*. His works include *Central Park* (1868); *The House Beautiful* (1878); and a new translation of Lübke's *History of Art* (2 vols., 1878). In 1884 he became the editor of *The Studio*.

COOK, Edward Dutton, an English dramatic critic and popular novelist; born in London, Jan. 30, 1829. He was originally intended to follow his father's profession of a lawyer, but gave it up to devote himself entirely to literature. Among his novels may be mentioned *The Trials of the Tredgolds; Hobson's Choice;* and *Paul Foster's Daughter*. He died in London, Sept. 11, 1883.

COOK, Edward Tyas, a British journalist and man of letters. He was born at Brighton, May 12, 1857; educated at Winchester School and New College, Oxford. In 1890–92 he was editor of the *Pall Mall Gazette* in succession to W. T. Stead, and in 1896 editor of the *Daily News*. In 1893 he became first editor of *The Westminster Gazette*. He is the author of *A Popular Handbook to the National Gallery* (5th ed. 1896); *Studies in Ruskin* (1890); and *Popular Handbook of the Tate Gallery* (1898).

COOK, Eliza, a favorite minor English poetess, daughter of a London tradesman; born at Southwark Dec. 24, 1812. She contributed poetical pieces to various magazines from an early age, and issued *Lays of a Wild Harp* (1835); *Melaia, and Other Poems* (1840); and from Sept., 1849, to 1854 successfully conducted *Eliza Cook's Journal*. She wrote verses such as *The Old Arm Chair;* also, *Jottings from My Journal* (1860); *New Echoes* (1864); and *Laconics* (1865). She died Sept. 24, 1889.

COOK, Francis Augustus, American naval officer, was born in Massachusetts in 1843. On Sept. 20, 1860, he was appointed from that state to the Naval Academy, where he remained till 1863. In October, 1863, he was made ensign, and for about two years was attached to the steam-sloop *Seminole*, of the West Gulf blockading squadron. On Nov. 10, 1866, he was promoted to be master, and in 1867–68 was attached to the North Atlantic squadron. He gained his commission as lieutenant on Feb. 21, 1867, and as lieutenant-commander on March 12, 1868, and served successively on the *Independence*, *Richmond*, *Sabine*, and *Plymouth*, obtaining his promotion as commander in October, 1881. In 1883–86 he was lighthouse inspector; in 1890–93 inspector of ordnance at the Navy Yard, Boston; and in 1893–95 assistant at the Bureau of Navigation. On Feb. 28, 1896, he was made captain. During the war with Spain (April–August, 1898) he was captain of the first-class armored cruiser *Brooklyn*, Commodore Schley's flagship, and did splendid service at the battle off Santiago de Cuba (July 3), the speed of the *Brooklyn* enabling her to overhaul and head off, and so prevent the escape of, the *Cristobal Colon*, the fleetest of the Spanish vessels, and thereby make the victory complete.

COOK, Joseph, an American lecturer on social and religious topics; born in Ticonderoga, N. Y., Jan. 26, 1838; graduated at Harvard in 1865. He was licensed to preach in 1868, and in 1868–71 he preached in Andover and Lynn, Mass. In 1871–73 he studied in Europe, Asia, and Africa. In 1873 he returned to the United States and lectured on the relations of religion and science. In 1880 he made a lecturing tour around the world. His published works, chiefly on religious subjects, are mainly remarkable for the vigor with which he strove to reconcile the discoveries of science with orthodox religion. His *Boston Monday Lectures* comprised several volumes.

COOKE, George Frederick, actor; born in Westminster, England, April 17, 1756. He made his first public appearance at Brentford in 1776, and in the period between 1784 and 1800 became very popular in the English provinces and in Ireland. From 1801 to 1810 he played at Covent Garden, both in comedy and in tragedy. In 1810 he visited America, and appeared before enthusiastic audiences in the chief Northern cities. He died in New York city, Sept. 26, 1812, and is buried in St. Paul's churchyard, in that city.

COOKE, George Willis, an American Unitarian preacher and author; born at Comstock, Michigan, April 23, 1848; ordained at Meadville Theological School in 1872; held pastoral charges in Wisconsin, Michigan, Indiana, and Massachusetts. He has written *Emerson: His Life, Writings, and Philosophy* (1881); *George Eliot: A Critical Study of Her Life, Writings, and Philosophy* (1883); *A Guide-book to the Works of Robert Browning* (1891); and a *History of Woman*.

COOKE, Jay, an American financier; born in Sandusky, Ohio, Aug. 10, 1821. In 1861 he established in Philadelphia the firm of Jay Cooke and Co., of which he was the head, and this house became the government agent for the placing of war loans. At the conclusion of the war the firm became the agent for the Northern Pacific railroad, and the suspension of the banking-house, growing out of its connection with that enterprise, was one of the causes of the financial panic of 1873. Mr. Cooke afterward resumed business with success.

COOKE, John Esten, a Confederate soldier and Virginian novelist; born in Winchester, Va., Nov. 3, 1830; the son of John Rodgers Cooke, an eminent Virginia jurist, and nephew of General Philip St. George Cooke (q. v., in these Supplements). At an early age he removed to Richmond, where he was educated for the bar. He soon abandoned law for literature, moved thereto by the success of his story, in the Fenimore Cooper strain, entitled *Leather Stocking and Silk, a Story of the Valley of Virginia* (1854). In the same year the Harpers published his *Youth of Jefferson* and *The Virginia Comedians*, romances of Virginian life and manners in the eighteenth century. With several later works he became the delineator of colonial Virginian life, and was accepted as the portrayer of this special feature of Southern conditions. His style was marred by superabundant sentiment and ornamentation. The Civil War found him on the staff of his relative, Gen. R. E. Lee. He served in nearly all the battles of Virginia, and at Lee's

surrender was inspector-general of the horse artillery of the army of northern Virginia. After Appomattox he resumed his pen, but it ran on war themes, interweaving reminiscence with romance, and softening the stern features of war with the glamor of chivalry. In addition to lives of *Stonewall Jackson* (1863) and *R. E. Lee* (1871), his pen produced 15 romances of wartime. He edited a *Life of Captain John Smith* and prepared *Virginia, a History of the People* (1883) for the American Commonwealth Series. This became very popular as a text-book. His last work was *My Lady Pokahontas* (1885), a novel version of the old colonial story. He died at The Briars, in Clark County, Virginia, Sept. 27, 1886.

COOKE, Josiah Parsons, an American chemist; born in Boston, Massachusetts, Oct. 12, 1827; educated at Boston and Harvard; tutor in mathematics at Harvard in 1849, and later instructor in chemistry, Erving professor of chemistry and mineralogy and director of the chemical laboratory. His *alma mater* and the University of Cambridge, England, have conferred several honorary degrees upon Dr. Cooke for his valuable works. These include *Chemical Problems and Reactions* (1853); *Elements of Chemical Physics* (1860); *Principles of Chemical Philosophy* (1866); *The New Chemistry* (1871); *Religion and Chemistry* (1864); *The Credentials of Science the Warrant of Faith* (1888). Died in Newport, R. I., Sept. 3, 1894.

COOKE, Mordecai Cubitt, an English botanist of note; born at Horning, July 12, 1825; editor of *Grevillea* from 1872 to 1892, and for many years mycologist at the Royal Botanic Gardens, Kew, near London. His botanical works, mainly devoted to the fungi, are numerous and valuable. They include *Illustrations of British Fungi; Mycographia; Handbook of British Fungi; Rust, Smut, Mildew and Mould; Handbook of Australian Fungi; British Fresh-water Algæ; British Desmids*; etc.

COOKE, Philip St. George, an American military officer; born near Leesburg, in Berkeley County, Virginia, June 13, 1809; graduated at West Point in 1827; served as an infantry officer on the Western frontier from 1827 to 1833, taking part in the Black Hawk war in 1832, and being present at the battle of Bad Axe. He was transferred to the dragoons, and was on frontier service from 1833 to 1846, and saw active service in California, the Kansas border troubles and the Mormon disturbances. Secession had no charms for this loyal son of Virginia. In the Civil War he fought against many of his kinsmen, but always under a coat of Union blue. He saw service in the Virginia peninsula, at Yorktown, Williamsburg, Gaines's Mill and Glendale; was in command at Baton Rouge, Louisiana, and superintendent of recruiting from 1864 to 1866. Reconstruction days found him in command of the department of the Platte, whence, in 1867, he came East to command the Lake department. He became a brevet major-general in 1865, and retired from the army to practice law, Oct. 29, 1873. His autobiographical *Scenes and Adventures in the Army* (1856) and *The Conquest of New Mexico and California* are his principal literary works. He died at Detroit, Michigan, March 20, 1895.

COOKE, Rose (Terry), an American poetess and writer of stories; born at West Hartford, Connecticut, Feb. 17, 1827; educated at the Hartford Female Seminary. In 1873 she married Rollin H. Cooke, an iron manufacturer, and removed to Winsted, Connecticut. Her *Mormon's Wife* appeared in *Graham's Magazine* before she was eighteen years old. She contributed many stories and poems to various periodicals. The following are some of her books: *Poems by Rose Terry* (1860); *Happy Dodd* (1875); *Somebody's Neighbors* (1881); *Root Bound* (1866); *The Sphinx's Children and Other People's* (1886); and *Poems, Complete Edition* (1888). Her studies of life and character in rural New England were faithful and attractive. She died in Pittsfield, Massachusetts, July 18, 1892.

COOLEY, Thomas McIntyre, an American jurist; born at Attica, New York, Jan. 6, 1824. He was admitted to the bar in 1846. In 1858 he was appointed reporter of the supreme court of Michigan, which office he held for seven years. In 1859 he became professor, and a little later the dean of the faculty of the law department of the University of Michigan. In 1864 he was elected justice of the supreme court of Michigan, and in 1869 he was re-elected for a term of eight years, having already become chief justice in the year 1867. In 1881 he again joined the faculty of the University of Michigan, becoming professor of constitutional and administrative law. His works on these branches are standard, and he was a great authority on these and kindred legal subjects. In 1887–91 he was chairman of the Interstate Commerce Commission. Died at Ann Arbor, Mich., Sept. 12, 1898.

THOMAS M. COOLEY.

COOMBS, Leslie, an American soldier; born near Boonesboro, Kentucky, Nov. 28, 1793. Leslie was the twelfth child of a Virginia farmer, who, in 1782, settled in the wilds of Kentucky. At 19 years of age he entered the army. On June 2, 1813, he was made captain of spies in a regiment of Kentucky volunteers. During a conflict at Fort Miami, on May 5th he was wounded. After peace was declared, Coombs read law, and later pursued a successful practice. In 1836, during the Texas struggle with Mexico, he raised a regiment of volunteers. In succession he became state auditor, and for several terms was elected to the legislature. During the campaign of General Harrison for the Presidency, Coombs became an active stump speaker, and as such was engaged in several Western and Southwestern states. In this department he had few rivals; to

hear him was to believe in him. When the war with Mexico began, he was active in raising volunteers in Kentucky. In 1844 he made many speeches in favor of Henry Clay, the Whig nominee for the Presidency. In 1860 he was chosen clerk of the Kentucky court of appeals. During the Civil War, General Coombs was ardently devoted to the cause of the Union. His last years were spent in retirement. He died in Lexington, Kentucky, Aug. 21, 1881.

COOPER, Myles, an English clergyman; born in England in 1735. He graduated at Oxford in 1760, and became a Fellow of Queen's College. In 1762 he came to America as an assistant of President Johnson of King's College, where he became professor of mental and moral philosophy. In the year following he became president. During 1771 President Cooper went to England and returned a short time before the opening of the Revolution. It is supposed that he published several tracts in the interest of the crown. His outspoken loyalist sentiments were unfavorably received by many, and his person was threatened with violence. On one occasion, it is said, he took to flight from a back window and fled to the house of a friend, sailing for England on the day following. When he reached that country, two parishes were placed in his charge; one in Berkshire and the other in Edinburgh, in which latter place he died, May 1, 1785.

COOPER, Peter, an American philanthropist; born in New York City, Feb. 12, 1791. His grandfather, John Campbell, a skillful potter in New York, served in the Revolutionary army as deputy quartermaster, and his father, who had served as a lieutenant, resumed his business of hat-making after the war. He removed to Peekskill, where he opened a country store, began the brewing of ale, and later removed to Catskill, where he worked at hat-making, and also engaged in making bricks. His son Peter assisted him in all of these occupations, and removed with his father to Brooklyn, where they again made hats, and afterward settled in Newburgh and erected a brewery. In 1808 Peter was apprenticed to John Woodward, a carriage-maker, and while with him invented a machine for mortising the hubs of carriages, which proved of great value to his employer, who offered to establish him in business, which he declined. His business ceased to be successful after the conclusion of peace with Great Britain in 1815, and he attempted the trade of cabinet-making, the grocery business and the manufacture of glue; for the latter he leased a factory for 21 years, and, in addition to glue, made oil, prepared chalk, whiting and isinglass. Subsequently he bought ten acres of land on Maspeth Avenue, Brooklyn, where the business has since been continued. In 1828 he bought 3,000 acres of land in Baltimore, where he erected the Canton Iron Works, the first of his great enterprises in the development of the iron industry in the United States.

PETER COOPER.

During the excitement over the building of the Baltimore and Ohio railroad in 1830, Peter Cooper constructed, from his own designs, the first locomotive-engine ever made in this country, the *Tom Thumb*, by which means the possibility of building railroads with little capital was demonstrated, and the Baltimore and Ohio railroad was saved from bankruptcy. Soon after this Mr. Cooper sold his iron-works in Baltimore, and, returning to New York, built an iron factory, which he afterward turned into a rolling-mill, where he first successfully applied anthracite coal to the puddling of iron, and made iron wire for several years. In 1845 he removed his works to Trenton, New Jersey, and built three blast-furnaces in Phillipsburg, near Easton, Pennsylvania, the largest then known; bought the Andover iron-mines, and built a railroad through the eight miles of country, to bring the ore to his furnaces at the rate of 40,000 tons a year. Mr. Cooper was president of the New York, Newfoundland and London Telegraph Company, the laying of the Atlantic cable having been accomplished largely by his efforts and liberality. He served in both branches of the New York common council and advocated the construction of the Croton aqueduct.

He was a trustee of the Public School Society, and, awakened to the necessity of a liberal and industrial education, resolved to assist younger generations to procure what had been denied to himself. With this idea he bought the property at the intersection of Third and Fourth avenues, between Seventh and Eighth streets, and built here, from his own plans, the Cooper Union, for the advancement of science and art. The corner-stone was laid in 1854, and, five years afterward, he gave a deed of the property to the trustees, incorporated by the state legislature. Thus far the building, with its improvements, has cost nearly $750,000. It has an endowment of $200,000 for the support of a free reading-room and library. Its annual income is about $60,000, derived from rents. During the financial agitation in the United States following the crisis of 1873, Mr. Cooper was active in the Greenback movement, and in 1876 the National Independent party nominated him for President. He died in New York City, April 4, 1883.

COOPER, Susan Fenimore, an American authoress, second child of James Fenimore Cooper; (q.v., Vol. VI, p. 337); born in Scarsdale, New York, in 1813. For several years before the death of her father she was his secretary and amanuensis. In 1873 she founded an orphanage in Cooperstown, New York, and in 1886 established the Friendly Society, an association of ladies to care for the inmates of the orphanage. Her published works are *Rural Hours* (1850); *Country Hours; or, Journal of a Naturalist* (1852);

Rhyme and Reason of Country Life (1854); and *Mt. Vernon to the Children of America* (1858). Her works, though little read at the present day, had merits of their own, and showed considerable power of observation and a pleasing, cultivated style. She died in Cooperstown, New York, Dec. 31, 1894.

COOPER, THOMAS, an Anglo-American scientist; born in England in 1759. He studied law in England, and then went to France, where he took a course in chemistry. In 1795 he moved to the United States and practiced law in Northumberland, Pennsylvania. In 1811–14 he was professor of chemistry in Dickinson College, and in 1816–21 held a similar position in the University of Pennsylvania. From 1820 to 1834 he was president of the College of South Carolina. Mr. Cooper published many works on political and scientific subjects, and died in America in 1840.

COOPER, THOMAS, an English political agitator; born in Leicester in March, 1805, the son of a poor widow. He was bred a shoemaker, opened a school in Lincoln, joined the Wesleyan Methodists and became a local preacher. In 1839 he went to London to enter upon journalism, but found little success. Returning to Leicester, he joined the standards of CHARTISM (q.v., Vol V, p. 433), and was as fiery in utterance as Feargus O'Connor. Indicted and acquitted for arson following a riot at Hanley, in Staffordshire, in 1842, he was subsequently convicted of seditious conspiracy and imprisoned for two years in Stafford jail. Here he composed an epic in Spenserian stanza, *The Purgatory of Suicides*, full of force, and not without merit. On his release he still meddled in politics, but the firebrand utterances were gone. He lectured on political and social subjects; was an atheist for ten years, but returned to belief and the Baptists. W. E. Forster, Samuel Morley and a few friends saved his last years from want by an annuity of $500. In 1882 he published his autobiography, of personal interest, rather than literary merit. He died in Lincoln, July 15, 1892.

CO-OPERATIVE BANKS. See BUILDING AND LOAN ASSOCIATIONS, in these Supplements.

COOPERSTOWN, a pleasant village and the capital of Otsego County, southeastern central New York, on the Cooperstown and Charlotte Valley railroad, named for the novelist James Fenimore Cooper, who once resided here. It lies at the south end of Otsego Lake. An academy, a hospital and an orphan asylum are located here. Population 1890, 2,657.

COOSA, a river of the southern United States, formed at Rome, Georgia, by the junction of the Etowah and Oostanaula rivers; thence it flows westward into Alabama, then southward, and with many windings reaches the Tallapoosa River, with which it unites to form the Alabama, in the eastern central part of the state. Length, about 350 miles.

COOS BAY, a large inlet in the coast of southern Oregon, in Coos County. Its entrance is just northeast of Cape Arago, lat. 43° 20′ 38″ N., long. 124° 22′ 11″ W. The bay receives the waters of the Coos, Milticoma, and several smaller rivers. The surrounding country is elevated and densely timbered, and on its south side are large beds of Tertiary lignite coal.

COPAIBA, BALSAM OF. See BALSAM, Vol. III, p. 293.

COPAIS, the ancient name of Lake Topolias, a body of water in Bœotia, eastern central Greece. Its size varies with the seasons; in summer it almost entirely disappears. It receives the waters of Mavro Potamos (Cephissus), and discharges its waters through natural and artificial subterranean channels. The lake owes its existence to the fact that these channels cannot always carry away the waters which the Mavro brings down. It was anciently famous for its eels.

COPE, CHARLES WEST, an English painter; born in Leeds, Yorkshire, in 1811. His paintings are chiefly of a historical nature, but he also executed some valuable domestic pieces. He frescoed the peers' corridor in the Houses of Parliament. He became a Royal Academician in 1848, and professor of painting to the Academy in 1867. Among his notable paintings are *Hagar and Ishmael* (1836); *The Cotter's Saturday Night; Edward the Black Prince Receiving the Order of the Garter* (1845); and *The Last Days of Wolsey*, painted for Prince Albert. His plate of *The Life Class* is considered one of the finest English etchings. He died at Bournemouth, Hampshire, Aug. 21, 1890.

COPE, EDWARD DRINKER, an American naturalist; born in Philadelphia, Pennsylvania, July 28, 1840. His great-grandfather, Caleb Cope, protected Major André from a mob in 1775; his grandfather, Thomas PymCope, established a line of ships across the Atlantic, and founded a great linen-house in Philadelphia. On his retirement the business passed into the hands of his sons, Henry and Alfred, under the firm name of Cope Brothers, and Edward Cope was the son of the latter. His early education was acquired at Westtown Academy and the University of Pennsylvania. He studied comparative anatomy in the Academy of Sciences in Philadelphia, and then spent the years 1863–64 in study in the universities of Europe, returning in 1864 to accept the chair of natural science in Haverford College, which he resigned in 1867. Meanwhile he became palæontologist to the United States government surveys under Hayden and Wheeler, discovering more than one thousand new species of extinct and recent vertebrates. In 1869 he was called to the chair of geology in the University of Pennsylvania. He became a member of the National Academy of Science, was vice-president of the American Association for the Advancement of Science in 1884 and its president

E. D. COPE.

in 1896, and of many other scientific societies in America and Europe. The Bigsby gold medal was conferred on him in 1879 by the Geological Society of Great Britain. A graceful writer, he contributed some four hundred papers to the literature of science, for the most part in favor of the doctrine of evolution, being a strong advocate of the Neo-Lamarckian school. (See HEREDITY, in these Supplements.) He is the senior editor of the *American Naturalist.* Among his published works on palæontology are *History of the Cetacea of the Eastern North American Coast* (1866); *Systematic Arrangement of the Extinct Batrachia, Reptilia and Aves of North America* (1869–70); *Extinct Vertebrata of the Eocene Formations of Wyoming* (1873); *Tertiary Vertebrata* (1885); *The Batrachia of North America* (1889); *The Snakes and Lizards of North America* (1896); and of evolution: *On the Origin of Genera* (1868); *Hypothesis of Evolution, Physical and Metaphysical* (1870); *Evolution and Its Consequences* (1872); *The Origin of Will* (1877); *Origin of Man and Other Vertebrates* (1885); *The Energy of Life Evolution, and how it has Acted* (1885); *The Origin of the Fittest* (1886); and *The Primary Factors of Organic Evolution* (1896). Died in Philadelphia, April 12, 1897.

COPEHAN INDIANS. See *California Indians,* under INDIANS, Vol. XII, p. 826.

COPELAND, RALPH, astronomer royal for Scotland and professor of practical astronomy in the University of Edinburgh. He was born at Woodplumpton, Lancashire, in 1837. He determined early to devote his life to astronomy, and studied at the University of Göttingen, becoming assistant to the late Professor Klinkerfuss at the observatory there. He assisted Earl Rosse in his astronomical observations. Since 1876 he has been connected with Lord Crawford's observatory at Dun Echt. In order to observe properly the transit of Venus, he visited Mauritius and Jamaica. He also traveled extensively in Peru and Bolivia, in which countries he pursued his observations and scientific studies, frequently at heights exceeding fourteen thousand feet.

COPEPODA. See CRUSTACEA, Vol. VI, p. 664.

COPPÉE, FRANCIS EDOUARD JOACHIM, sometimes known as François Coppée, a French author; born in Paris, Jan. 12, 1842; educated at the St. Louis Lyceum, and employed in his early years on the clerical staff of the French war department. His first laurels were won as a poet, and while young. Romantic verse for recitation soon made him famous. Then he turned to the theater as affording a wider scope for his talents, writing several popular dramas. Napoleon III took an interest in him, and appointed him one of the librarians in the Luxembourg Palace. In 1878 he was chosen archivist of the Comédie Française, was elected to the French Academy, Feb. 24, 1884, and in 1888 was made an officer of the Legion of Honor. Coppée has published several volumes of poems, prose sketches and romances. Among his most successful plays may be mentioned *Le Passant* (1869); *Fais ce que Dois* (1871); *Le Luthier de Crémone* (1877); *La Guerre de Cent Ans* (1878); *Madame de Maintenon* (1881); *Les Jacobites* (1885); *For the Crown* (1895). His collected plays were published in four volumes in 1886.

COPPÉE, HENRY, an American educator; born in Savannah, Ga., October 13, 1821; educated at Yale and West Point, graduating in 1839 and 1845, respectively. He served as an officer of artillery through the Mexican War, and received the brevet of captain for gallantry. In 1850–55 he was assistant professor of geography, history, and ethics at West Point; and in 1855–66 was professor of English literature in the University of Pennsylvania. In 1866–75 he was president of Lehigh University, and then exchanged the presidency for the professorship of history. From 1874 till his death he was regent of the Smithsonian Institution. He published many works on scientific and other subjects. His last literary work was *Life of General George H. Thomas* (1893). He died in Bethlehem, Pa., March 22, 1895.

COPPERHEAD (*Ancistrodon contortrix*), a venomous serpent of the rattlesnake family, found in eastern North America. It possesses no rattles. The name refers to the bronze-colored head. The body is reddish brown above, with dark-brown transverse stripes and scattered spots; below, it is flesh-colored and spotted. Like its allies, it is viviparous. The term *copperhead* had a political significance during the stormy period of the Civil War. From the stealthy advance of the copperhead-snake, which, unlike the rattlesnake, gives no notice of its approach, the word was applied to the Northern sympathizers with slavery, secession and the South, who by secret organizations endeavored to impede the due prosecution of the war. It had an earlier use in the same sense, having first been applied to the Indians, and later to the Dutch colonists.

COPPERMINE RIVER, a stream in Canada, which enters a bay of the Arctic Ocean, northeast of the Great Bear Lake, after a course of about 300 miles. See also HEARNE, SAMUEL, Vol. XI, p. 551.

COPPER-MINING IN THE UNITED STATES. The copper-production in the United States in 1895 amounted to 386,453,850 pounds, and was chiefly confined to five or six states and territories.

Montana came first, with a production of 194,768,925 pounds; Michigan second, with 129,740,765 pounds; Arizona third, with 48,399,403 pounds,—a production for the two states and territory of 372,909,093 pounds, which is over 96 per cent of the entire output.

The United States is by far the largest producer of copper in the world, and possesses at least two of the greatest copper-mines in the world, the Anaconda of Montana being the first in size and the Calumet and Hecla of Lake Superior the third in size and importance in the world. The second place is held by the Rio Tinto mines of southern Spain, which produced about 50,000,000 pounds in 1895.

Of the United States ores, the richest in quality are those of Arizona, being oxides yielding about

ten per cent of metallic copper, and are easily reduced. The Montana ores yield about seven per cent of copper and a large amount of both silver and gold.

The Lake Superior ores are chiefly of native copper, and nearly pure, but the cost of production is not materially less than the Arizona or Montana ores.

Notwithstanding the general depression throughout the commercial world, the copper output in the United States in 1895 exceeded that in 1894 by about 30,000,000 pounds, and the market price of copper remained firm, even showing some advance. These facts are owing to the large extension of the uses into which the metal is coming. The chief demand is for electrical uses and appliances; but, besides this, there has been an increased demand for the brass and yellow-metal trade, as well as for the manufacture of weapons and cartridges, and in ship-building.

COPPER OR ATNA RIVER, a river of southeastern Alaska, which rises at the foot of Mt. Wrangell, at about lat. 62° 20′ N., long. 144° W., and flows west-northwest till it reaches the valley of the Alaskans; then along their southern slopes, then turns south and flows into the Pacific Ocean, where it has formed a delta. Its course is tortuous, and its length is about 400 miles. Its name comes from the copper found at points in its course.

COPPER OR CUIVRE RIVER, a stream of eastern Missouri, which rises in Audrain County, flows southeast, and empties into the Mississippi, 50 miles above St. Louis. It flows through a fertile, undulating agricultural and forest district. It is 130 miles long, and affords considerable motive power.

COPPER OXIDE CELL. See ELECTRICITY, § 105, in these Supplements.

COPRA, the native name for the dried kernel of the cocoanut, broken into small pieces for better stowage.

COPTIC CHURCH. See EGYPT, Vol. VII, pp. 728, 748, 749; see also ROMAN CATHOLIC CHURCH, Vol. XX, p. 631.

COPTIC LANGUAGE AND LITERATURE. See EGYPT, Vol. VIII, p. 721.

*COPYRIGHT. The article on COPYRIGHT, Vol. VI, pp. 356–367, brought the subject of protection to the reproduction of literary and art work down to 1877, and since that time the subject of international copyright has entered upon new phases, as well in Europe as in the United States. This is the only important part of the legislative system that needed much modification, and it was the one through which the greatest injustices were wrought. While most European states were well disposed to accord protection to pure mental productions, without regard to boundary lines, differences of speech lowered the value of such protection, except as to translations and dramatic, musical and art works, without the author's consent. Between the United Kingdom and the United States the condition of affairs was quite different, for together they comprised the largest reading constituency using one speech in the world. It has generally been represented that the United States most obstructed provisions for fair adjustments, owing to an enthusiasm there for cheap books, obtained in whatever way, a respect for protective principles of trade and the peculiar greed of American publishers. There is no real ground for this invidious distinction between the two countries. If piracy was not equally common, it was because literary fecundity was greater in Great Britain than in America, and her authors enjoyed the wider celebrity. That insular realm thought no good could come out of the Transatlantic Nazareth, and when it did come, publishers were more careful to suppress the knowledge of its origin than to forego the profits of its reproduction. American books were garbled, their scenes and names changed until they had the appearance of British authorship, and American authors were compelled to witness the filching, not only of their property, but of their renown.

For years there were prolonged discussions on this subject in literary and secular papers on both sides of the sea, and repeated essays were made by both nations to come to some agreement on a reciprocal basis by treaty, but if the American publisher wished to get his literary wares for nothing, England, too, was reluctant to be just without compensation. So long as the publishers could influence their governments, all treaty negotiations were doomed to failure. The British publisher wished the American market opened to his expensive three-volumed editions without competition, and would approve of no copyright which would not secure him that boon. On the other hand, the American publisher was perhaps no less reluctant to be obliged to pay royalties on books that he heretofore had obtained freely by piracy. It is true that Parliamentary statutes made provision for copyright reciprocity, and the legislation of the United States did not. But it gradually became manifest that nothing would be accomplished by negotiation, and that the solution of the problem must be sought in Congressional legislation alone.

A movement began in 1878, in Paris, to promote greater security for authors and artists, and its promoters took the name of the Literary and Artistic International Association, and after seven years succeeded in organizing, at Berne, Switzerland, the International Copyright Union. The Berne conference of 1885 comprised representatives from Britain, Germany, France, Spain, Switzerland and Sweden and Norway, and it drafted a convention which gradually extended to Belgium, Italy, Portugal, Denmark and Mexico, and it now regulates the copyright reciprocity of those nations.

An act of Congress approved on the 3d of March, 1891, committed the United States to reciprocal international copyright, and went into operation on the following July 1st. Among the causes contributing to the revolution in a policy that had lasted for a century, the most potent

*Copyright, 1897, by The Werner Company.

was the union of organizations of authors, publishers and typographers to effect it.

From time to time, bills had been introduced into Congress to establish international copyright, but they had been smothered under the pretext that the public did not demand any change of legislation. It was necessary, therefore, to create a sentiment strong and definite enough to command respect at Washington. Abandoning all hope from treaty negotiations, an Authors' International Copyright League was organized on the 13th of April, 1883, to agitate for a reform on the moral ground of observing the sixth commandment. This association eventually became known as the American Copyright League, and it soon found allies in local organizations of like character.

American authors claimed that the production of pirated books was fatal to the welfare of their craft, because it enabled publishers to supply the reading demand of the public by cheap editions of foreign authors, on which they had no royalties to pay. Who would buy at a fair price an American manuscript, when he could reproduce, without other charge than the cost of manufacture, the best books of the best-known foreign writers?

There had also sprung up among the older publishers a usage known as the "courtesy of the trade." Under it an American publisher who bought advance sheets of any work from a British publisher, or made engagements with him for the reproduction of one of his books, was permitted by his American competitors to enjoy the monopoly of reproducing that publication in the United States. It was a usage that began with Matthew Carey and Sons of Philadelphia, who first bought advance sheets of the *Waverley Novels*, and it grew into an imperious custom of certain great houses. No profit accrued to authors, for they were not in the trade. When Anthony Trollope complained that his books were republished in the United States, from which he received not a penny of advantage, the American publisher of his novels publicly replied that he had uniformly remitted money proportionate to his sales to the English publisher. But there the money remained, leaving Trollope no richer. The usage had the peculiar merit that the American republisher could make his own terms, for, of course, the foreign house could not sell the American market, to which he had no legal title. The arrangement only operated to protect one American publisher against those of his competitors in this country who respected the "courtesy of the trade." But the gentility of this modified piracy could not obscure the lucrative character of the business, and new houses sprang up that did not observe the usage. To repress these cheap Ishmaelites of the trade, the older houses came at last to think an international copyright desirable. Hence, at the suggestion of the Authors' League, the American Publishers' Copyright League was organized in 1887, in New York. The two associations co-operated, and drew to their support two of the leading typographical unions in the country. After several bills upon which this federation was agreed had failed in Congress, but by decreasing majorities, the Chase bill, so named from its author, a Senator from Rhode Island, reached the President on the last day of the Fifty-first Congress, when his signature made it a law.

Under this act, copyright was opened to any author, without regard to nationality, with this restriction:

"That this act shall only apply to a citizen or subject of a foreign state or nation when such foreign state or nation permits to citizens of the United States of America the benefit of copyright on substantially the same basis as its own citizens, or when such foreign state or nation is party to an international agreement which provides for reciprocity in the granting of copyright, by the terms of which the United States of America may, at its pleasure, become a party to such an agreement. The existence of either of the conditions named shall be determined by the President of the United States by proclamation made from time to time, as the purposes of this act may require."

In 1896 the United States had entered into agreements of reciprocal copyright with Belgium, France, Germany, Great Britain and her possessions, Italy, Portugal, Spain, Switzerland and Denmark. An American may secure copyright in Belgium by registering his work at the Department of Agriculture, Industry and Public Works in Brussels. In France it is given upon the deposit of two copies of the work with the Minister of the Interior in Paris. In Great Britain the title must be entered at Stationers' Hall, London, and a fee of five shillings paid, with an equal additional sum if a certified copy of the entry is demanded. The work must be published simultaneously in the realm and in the United States, and five copies deposited at the Hall for four libraries and the British Museum. In Canada the work must be registered, and two copies deposited with the Minister of Agriculture at Ottawa, and a fee of one dollar paid, fifty cents being required for a certified copy of the entry. In Switzerland nothing is required, but the owner may register his work at Berne, in the Department of Commerce and Industry, and deposit a copy there, paying a fee of two francs.

A long mooted question as to whether one may reproduce anything one can memorize from the public representation of a drama or musical composition, not copyrighted, is definitely settled. Every unauthorized reproduction of a manuscript renders the perpetrator liable to action for damages. Copyrights are still assignable and heritable, and no change is made in the proprietary rights of renewal. Copyrightable works must be manufactured in the United States, and all piratical copies of them are to be destroyed at the custom-house, except that any person may purchase for use, and not for sale, not more than two copies of a foreign duplication of a copyrighted work, subject to tariff duties. Copyright covering only translations does not forbid the importation of copies of the original text. The Secretary of the Treasury is directed to make

up lists of copyrighted books from reports of the Librarian of Congress, and furnish them to custom-house officers weekly, in order to suppress the importation of duplicates, and for five dollars annually any one is entitled to receive these weekly statements. Amended editions of foreign works already published in the United States are subject to copyright, but no serial work, except magazines and other periodicals, of which the reproduction in the United States had begun before this act went into operation could be copyrighted as to their still unpublished parts. Publication must be at least simultaneous in the United States and any other country. Various penalties are provided for violations of copyright laws, from forfeiture of all unauthorized copies and damages to the injured party to fines divisible between the government and the copyright proprietor. The penalty for falsely printing on any work notice of copyright is one hundred dollars, to be divided between the United States and the complainant; for an unauthorized reproduction of any painting, statue or statuary a penalty of ten dollars for each discoverable copy may be collected.

The fees for copyright to a person resident in the United States are fifty cents for recording title or description, fifty cents for a certified copy of the record, one dollar for record of assignment, and one dollar for certified copy thereof. Foreigners must pay one dollar for orignal entry, and fifty cents for an official copy of it. All publications must be delivered to the librarian of Congress free of charge, and he has no authority to refuse any application for copyright for works not immoral, nor to decide questions of priority or infringement. The copyright jurisdiction is in the hands of the United States courts; the common-law rights to literary property still belong to state courts. Authors and assigns have exclusive right to translate or dramatize their own works, after having copyrighted the original. No copyright is valid unless notice thereof is in some way stamped or inscribed upon the work thus protected. In all other respects the provisions of the law of 1874 are in force. Amendments further desired by authors and artists, as represented in the Literary and Artistic International Association of Europe in the autumn of 1895 are: That the right of reproduction shall inhere in the author, and exist for the benefit of his heirs or assigns for fifty years after his death; that the sale or transfer of a material work, as a manuscript, picture or design, shall not, by implication, carry with it the right of reproduction; that the author who has parted with his copyright shall retain the right to supervise reproductions of his work and to prosecute piracies or unauthorized changes in it; that in encyclopædic work, while the director of the compilation remains in legal possession of the copyright for the whole work, individual contributors to it shall be entitled to reproduce their contribution, if by so doing they do not injure the entire publication; that works of art belonging to public museums shall not be reproduced without the consent of the original artist, or his heirs or assigns; and that anonymous, pseudonymous and posthumous works shall be entitled to protection for fifty years from the date of their first publication. The present tendency is to carry to its logical amplitude the doctrine that copyright shall recognize an author's or artist's work as personal property as much as if it were in its original form of manuscript, composition or design, save that a time-limit of protection is still respected, its extension, rather than abolition, being sought.

D. O. KELLOGG.

COQUELIN, BENOIT CONSTANT ("Coquelin Aîné"), a French actor; born at Boulogne-sur-Mer, Jan. 23, 1841; the son of a baker. Evincing a great aptitude for the stage, he went to Paris and was admitted to the Conservatoire on Dec. 29, 1859. He made his *début* at the Théâtre Français on Dec. 7, 1860, in the character of Gros-René in the *Dépit Amoureux*. He afterward played with success in the *Fourberies de Scapin*, *Le Mariage de Figaro*, *Don Juan*, and other classical pieces; Lupin in *La Mère Confidente*, the Marquis in *Le Joueur*, Don Hannibal in *L'Aventurière* etc. He created the *rôle* of Anatole in *Une Loge à l'Opéra*, John in *Trop Curieux*, Gagneux in *Jean Baudry*, Vincent in *L'Œillet Blanc*, Aristide in *Le Lion Amoureux*, Gringoire in a play of that name, Beaubourg in *Paul Forestier*, Eucrate in *Le Coq de Mycille*, etc. Coquelin obtained great success in society by reciting in private and at public meetings, and has also added to the reputation of new poets, particularly of Eugène Manuel and François Coppée. In a professional visit to America he met with a most enthusiastic reception. He has, to the great regret of all admirers of French comedy, persisted in his intention of keeping away from the Théâtre Français.—His books comprise several valuable contributions to the history of the stage and the art of acting.—His brother, ERNEST ALEXANDRE HONORÉ COQUELIN (Coquelin cadet), also a noted French actor, was born at Boulogne-sur-Mer, May 16, 1848. He also was intended for a baker, but preferred the risks attendant upon the duties of a railroad employee. Irresistibly attracted to the theater, he began a careful training at Paris in 1864, and made his initial appearances at the Odéon Théâtre. In 1868 he joined the Comédie Française and earned the applause of Parisian audiences by the side of his elder brother. When the Germans besieged Paris, Ernest Coquelin left the boards to follow the bugle, and won the Military Medal for his valor at the battle of Buzenval. His favorite *rôles* are those of Ulrich in Octave Feuillet's *Le Sphinx*, Frippesauce

M. COQUELIN.

in *Tabarin*, Isidor in *Le Testament de César Girodot*, Frederick in Erckmann-Chatrian's *L'Ami Fritz*, and Basil in *Le Barbier de Séville*. Like his elder brother, he has made several valuable contributions to the literature of the French stage.—The son of Coquelin Aîné, JEAN COQUELIN, has also distinguished himself as an actor. Born Dec. 1, 1865, he was destined for the stage from his earliest years. Attached to the Comédie Française, he has frequently, and with much success, filled the *rôles* so famous by his father's creation of them.

COQUILLA-NUTS. See NUT, Vol. XVII, p. 665; and ATTALEA, in these Supplements.

COQUIMBO, a province and city of central Chile. The province is bounded by Aconcagua on the south and Atacama on the north, with the Andes and the sea on the east and west. Its area is 12,873 square miles; population 1895, 160,898; capital, Serena; population 1895, 15,712. The city is on the coast, seven miles S.W. of Serena, and separated from it by a bay; has smelting-works, a large trade in copper and ores; chief industries, hay-raising, copper-smelting, and cattle-raising. The country is of little use for agriculture, except where irrigated. Pop. 8,440.

COQUIMBO OWL. See BURROWING OWL, in these Supplements.

COQUINA. See ST. AUGUSTINE, Vol. XXI.

CORAL ISLAND AND REEFS. See POLYNESIA, Vol. XIX, pp. 418–21.

CORALLIGENA OR SEA-ANEMONE. See ACTINOZOA, Vol. I, pp. 129–31.

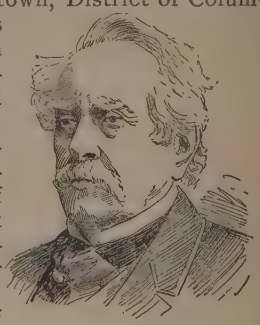
CORALLINES, a name given to a highly organized group of red algæ with branching bodies, and so encrusted with carbonate of lime that the plant becomes very hard and of a coral-like appearance. As a consequence of this structure, they occur as fossils. Common genera are *Corallina*, *Lithothamnion*, and *Lithophyllum*.

CORAOPOLIS, a post borough in Allegheny Co., Pa., 13 miles W. by N. of Pittsburg; has 3 churches, a newspaper office, oil-wells and refineries, lumber-mills, and tool-factories. Pop. 1890, 962.

CORBET, RICHARD, an English poet and bishop; born at Ewell, Surrey, 1582. He was educated at Westminster School, Broadgates Hall (now Pembroke College), and Christ Church, Oxford. He took orders, and already had enjoyed preferments at Cassington and Stewkeley, as well as a prebend in Salisbury, when, in 1620, he was made dean of Christ Church. In 1624 he was appointed to the see of Oxford, and translated to that of Norwich in 1632. Corbet's poetry reflects the genial temper and wit for which he was famous. His longest work is *Iter Boreale*, an account of the holiday tour of four students, written in a light, easy strain of descriptive humor; the best, as well as the best known, is the *Fairies' Farewell*. He died in Norwich, July 28, 1635.

CORBIN, AUSTIN, an American capitalist and financier, was born in Newport, New Hampshire, July 11, 1827, graduating from the Harvard Law School in 1849. After practicing law in his native town for a while, in 1851 he removed to Davenport, Iowa, where he lived for 14 years. He entered the banking business, with considerable success; returned to New York a rich man in 1865 and started the banking business of Austin Corbin and Company. A trip to Long Island with a sick child showed him the natural advantages of its shores as an outing-place for millons. Obtaining control of the principal one of its then isolated and badly managed roads, he planned a system of future purchases to bring all its railroads under one management. The consummation of his plans occurred only in the year of his death. He built the first railroad from Brooklyn to Coney Island, and was instrumental in erecting the first of the large hotels there. His New Hampshire estate of twelve thousand acres was his favorite hobby, and its forests and lakes became in his hands a hunter's paradise. He was killed in a carriage accident, at Newport, N. H., June 4, 1896.

CORCORAN, WILLIAM WILSON, an American banker; born in Georgetown, District of Columbia, Dec. 27, 1798. His father was an Irishman who settled in Georgetown, where he occupied several minor local offices. For a time the son attended Georgetown College, but at the age of seventeen became a clerk in the dry-goods and auction store of his two older brothers. In 1828 Mr. Corcoran had charge of the real estate held by the United States Bank and the Bank of Columbia in the District of Columbia, and continued their agent until 1836. In 1835 he was married to Miss Louise A. Morris. It was in 1837 that Mr. Corcoran began his career as banker and broker in Washington, and in 1840 formed a co-partnership with the late George W. Riggs. The firm reached a high reputation and attained to great wealth after many risks and a perilous escape from disaster. In 1854 Mr. Corcoran retired from the banking business, and began to give much of his time and attention to objects of benevolence. Oak Hill, the Louise Home and the Corcoran Gallery of Art are among his creations, together with many gifts to colleges, seminaries and charities to the extent of several millions. He died in Washington, District of Columbia, Feb. 24, 1888.



WILLIAM W. CORCORAN.

CORCYRA, the ancient name of CORFU; q.v., Vol. VI, p. 396.

CORDER, FREDERICK, a British musical composer; born in London, England, Jan. 26, 1852. He showed a strong inclination for music from his earliest years, and, released from business by the failure of a firm, he entered the Royal Academy of Music at the age of eighteen. Here, in eighteen months, he won the Mendelssohn scholarship, and was sent to Cologne to pursue his studies. In four years' time he returned to England as conductor at the Brighton Aquarium. In the judgment of Sir George Grove, he is one of

the foremost of rising young composers. His romantic opera, *Nordisa*, is the most popular of some twenty published works.

CORDILLERAS (Sp., "chain of mountains"), a term occasionally used of the mountains in the region west of the great plains of North America, and frequently of the Andean chain of South America. See AMERICA, Vol. I, p. 678; ANDES, Vol. II, p. 15; ECUADOR, Vol. VII, p. 644; PERU, Vol. XVIII, p. 672; HONDURAS, Vol. XII, p. 131; MEXICO, Vol. XVI, p. 215; PARAGUAY, Vol. XVIII, p. 243; and UNITED STATES, Vol. XXIII, p. 793.

CORDITE. See GUNPOWDERS, in these Supplements.

CORDOVAN LEATHER is largely manufactured in Germany, Scotland, and in more recent years in America. It is produced from the skins or hides from horses, asses, mules and colts.

The process is as follows: After removal of the hide from the animal it is customary to cut it into two parts, measuring from the root of the tail 18 inches forward on the backbone. The hide is cut, at right angles to the backbone, directly across; the part so cut off is termed a "butt," and as such becomes a distinct article of commerce. The forward part of the hide is termed a "front," and is used, after being divided on the line of the backbone, for various purposes, principally, after being tanned, for use as glove-leather, or, blackened, to be used in the tops of shoes. These fronts are tanned so as to be finished on the grain side. The thinness of the shoulder and flanks renders this leather not altogether desirable for many purposes. The grain of the fronts, however, is particularly fine, and by careful manipulation can be made to closely represent that of genuine kangaroo. As a substitute for the latter it finds ready sale for shoe purposes. The butts, after undergoing a special tanning process, tending to produce a pliable and at the same time non-stretching leather, are passed through a splitting-machine which removes the grain, or hair side, revealing what is termed the "shell." This shell is found to lie on either side of the backbone, never, except in mule-hides, extending over the backbone. In appearance it is almost black, the line of demarcation being distinct and vivid between it and the other portions of the butt. In nature, the shell is exceptionally close-fibered, and makes, when properly blackened and finished, a leather impervious to water, and so smooth and pliable that it is used only in the manufacture of fine shoes for both men and women.

The term *Cordovan leather*, in trade circles, applies to the product both of the tanned fronts and tanned butts, but is especially used in connection with the term *galoshes*, meaning the vamps or boot-fronts cut from the shell of the butt. There are few, if any, other than the above-named animals whose hides present this peculiar region or so-called shell. In form it is elliptical, and extends well back upon the hips of the animal, and forward, covering the region of the vital organs which are not protected by the ribs.

As above stated, there are two distinct shells upon each butt, separated, except in case of asses and mules, by a strip four to six inches in width, lengthwise of the backbone. In area each shell contains from three to five square feet, according to the size of the animal. The remainder of the butt, in its nature and in its products, is identical with that of the so-called fronts.

COREA (CH'AO-HSIEN or KAOLE). In addition to the description given under COREA, Vol. VI, pp. 390–394, a more extended knowledge has been gained of the statistics, people and topography of the "Hermit Kingdom" by the events of the Yellow War. In 1894 China and Japan became involved in hostilities from their conflicting claims to regulate the affairs of Corea. In 1876 Corea had concluded a treaty with Japan, in 1882 with China (Trade and Frontier Regulations) and the United States, in 1883 with Germany and Great Britain, in 1884 with Italy and Russia, in 1886 with France, and in 1892 with Austria. An overland trade convention has also been concluded with Russia. In these treaties Corea was treated with as an independent state, and by virtue of them, Seoul and the three ports of Jenchuan, Fusan, and Yuensan were opened to foreign commerce. In 1894 violent internal disturbances occurred. The Coreans, split into Chinese and Japanese factions, and appealed to each power for aid. When China sent troops to quell the riots, Japan protested against a violation of the treaty of 1876. Then Japan landed five thousand men on the west coast, June 3, 1894, under the pretext of escorting the Japanese minister in safety from the country. The army having seized strategical positions, the Mikado's ambassador, Mr. Otori, made a demand for five immediate reforms in Corean affairs. China demanded the withdrawal of the Japanese troops, invoked in vain the aid of Russia, but secured an appeal by the European representatives for mutual concessions. Then the Japanese seized the Corean king, July 23d, and compelled him to appoint Tai Wen Kun as regent. Hostilities began with a naval engagement in Prince Gerome Gulf, July 25th, and a sea battle between cruisers, on the same date, off Fontao Island. In each case the Japanese were victorious. The formal declaration of war was made August 1st, and by the 26th of the same month Mr. Otori had concluded a treaty of alliance between Japan and the Corean government. Then the "Yellow War," as it has been well termed, began in good earnest on land. Its whole burden fell on Li Hung Chang, the Viceroy of China. His army was not one quarter the strength of the Japanese. Deficient and antiquated in equipment, with poltroons for commanders, the land forces were on a par with a navy crippled by the resignation of all the English engineers (in accordance with neutrality proclamations), and commanded by cowardly mandarins. Under Field-Marshal Count Yamagata the Japanese soon landed 10,000 troops at Fusan, 3,000 at Gensan, near Port Lazareff, and 30,000 at Chemulpo. To oppose these, some 30,000 Chinese

troops were concentrated at Wiju, whence, with some reinforcements, they were marched 100 miles southward to confront the victorious Japanese at Ping Yang. In this vicinity strategic movements and skirmishes occurred for some time, generally resulting in favor of the Japanese. The Japanese commanders were graduates of the first military schools of Germany, the soldiers armed with modern rifles, and the entire army drilled in European methods. To confront these were venal and ignorant mandarins, supported by a barbarian horde, more suited, as to arms and equipment, for an encounter with crusaders of a long past age. On September 16th, the Japanese, attacking the Chinese lines at Ping Yang in front, at the same moment that a second column came into action on the flanks and in rear, routed their opponents with terrific slaughter. The Chinese loss was over 16,000, as against a Japanese casualty list of 30 killed and 270 wounded. Four Chinese generals, many thousand rifles, immense military stores and three million dollars fell into the victors' hands. Disaster on sea followed the next day, and at the sea fight of the Yalu River the Chinese navy was almost entirely destroyed or captured. The only vessel which did fight in earnest for the honor of the Flowery Kingdom was, it may be said, commanded by an American graduate of Annapolis. After the capture of Ping Yang and the whole of the Chinese invading force, the Japanese marched to invade Manchuria. Victorious at Wiju, and carrying Hu-Shan by vigorous assault on October 25th, the Japanese columns marched through Manchuria and proceeded to invest Port Arthur. Here the demoralized remnants of the Chinese army made a desperate stand, until panic-stricken by repeated assaults, and, deserted by their commanders, they fled in disorder, and Port Arthur fell on November 22d into the hands of the Japanese, with 80 guns and immense stores.

With the fall of Port Arthur the reserves of Japan were called to the colors, and a second army mobilized and landed on the Chinese coast, near Kinchow, in the Gulf of Liao. Marching through Manchuria, in the direction of Ninchang, though retarded by the severe cold, the Japanese fought at Kungwasai, on December 19th, the most stubbornly contested battle of the war. Four charges were necessary to carry the Chinese works, and these cost the Japanese 450 men. The victors advanced to To Chung Su and occupied a position of great strategic value, preparatory to a march on Pekin in the spring. On February 16th the naval station of Wei-Hai-Wei fell into the invaders' hands, and China hurried a peace embassy to Tokyo to beg for terms. By the treaty of Shimonoseki, signed April 17, 1895, and ratified at Chefoo, May 8th, the independence of Corea was proclaimed and declared, and the southern part of the Chinese province of Feng Tien, being the part of Manchuria occupied in the war, was ceded to Japan, with a war indemnity of 200,000,000 kuping taels (i.e., $150,000,000). Formosa was also ceded to Japan. At the request of Russia, and in consideration of an increased war indemnity, Port Arthur was evacuated by the victors.

The present ruler of Corea is Ni-Kung (Li-Hi in Chinese), born in 1852, succeeded to the throne in 1864, and is the twenty-ninth in succession since the founding of the present dynasty. The constitution may be briefly described as follows: The king is an independent sovereign, but his power is limited by the cabinet, which originates laws for the king's ratification. The central government consists of nine departments, each presided over by a minister of state. The eight old provinces have been abolished, 23 pu, or counties, subdivided into 336 kün, or districts, being substituted. Revenue is derived from the land tax, the maritime customs and the sale of ginseng.

An embryo army of 2,000 men is under Japanese instructors, a naval school has been formed, with English instructors, and a police force of 1,500 men organized under a special department.

The total value of the trade at the three ports was, in 1894: Imports, $5,843,189; exports, $3,456,140; the imports, consisting of cotton goods, chiefly shirtings and muslins, $2,379,980; woolen goods, $45,009; metals, $164,060; sundries, $3,253,340; the exports, beans, $515,310; cowhides, $329,440; rice, $1,210,150. The export of gold, which is found in considerable quantities in the country, but is not well worked, was $749,699 for 1890. The number of vessels entering from foreign countries in 1894 was 1,313 (mostly junks), of 365,301 tons.

CORELLI, Marie, English novelist, was born of Italian parents and adopted when a child by the late Dr. Charles Mackay, and at his death became the ward of his son, Eric S. Mackay, author of "The Love Letters of a Violinist." Her writings are pervaded by an element of mysticism, fascinating to those who love the supernatural and long to peer behind the veil of the flesh. Her early stories include "The Romance of Two Worlds" (1886), "Vendetta" (1887), "Thelma" (1888), "Ardath" 1889, "Wormwood" (1890), "Soul of Lilith" (1892), "Barabbas" (1893), "The Sorrows of Satan" (1894), "The Mystery of an Atom" (1895).

CORENTYN, a river of Guiana, South America, separating the British and Dutch possessions. It rises in the Acara Mountains and flows generally northward, emptying into the Atlantic at long. 57° W. It has four large cataracts, the lower two being of great beauty. It is about 500 miles long, and is navigable for vessels of light draft for 150 miles.

COREOPSIS, a large genus of the family *Compositæ*, abundant in North and South America and in South Africa. The involucre is double, the rays are mostly yellow and the flat akenes (fruits) have generally two or three teeth or awns, but not barbed, as in the closely related *Bidens*. The species are generally known as "tickseeds," and several of them are cultivated on account of their showy flowers. The most common cultivated form is *C. tinctoria*, the common Coreopsis or Calliopsis of the gardens, with the large yellow rays brownish purple at base,

or even brownish throughout. See Vol. XII, p. 251.

CORFIELD, WILLIAM HENRY, an English physician and sanitary expert; born at Shrewsbury in December, 1843. Studying medicine, hygiene and natural science, he took many honors and degrees, was appointed professor of hygiene and public health at University College, London (1869), and has written *Dwelling Houses: Their Sanitary Construction and Arrangement* (1879); *The Treatment and Utilization of Sewerage;* and *The Water Supply of Ancient Roman Cities.* He is chairman of the Council of the Sanitary Institute of Great Britain.

CORINTH, the capital of Alcorn County, northeastern Mississippi, and the most prominent city of the northern part of the state, is situated on the Memphis and Charleston and the Mobile and Ohio railroads, about 93 miles from Memphis, Tennessee. During the Civil War it was occupied successively by the Union and Confederate armies, being regarded by the commanders of the contesting forces as a point of the greatest strategical importance. After the battle of Pittsburg Landing, the Confederate army fell back upon Corinth. On May 30th following, General Beauregard evacuated the place, and it was taken possession of by the Union army under General Halleck. The command of the district was intrusted to Gen. W. S. Rosecrans, who made his headquarters at Corinth. On the night of October 3d of the same year, the place was attacked by the Confederate army under General Earl Van Dorn, consisting of the forces commanded by Generals Lovell, Price, Villepigue, Rust and others, and numbering, in the aggregate, about thirty thousand men. The attack was repulsed, but on the succeeding morning Van Dorn renewed hostilities, directing the movements of his army in person. For a brief period success crowned the efforts of the Confederates, but finally they were hurled back, and before noon were in full retreat. They were pursued by the commands of Generals Hurlbut and Ord, but ultimately escaped beyond the Hatchie River. Their losses amounted to 1,423 killed, and 2,225 wounded and prisoners. The Union army sustained a loss of 315 killed, 1,812 wounded and 232 missing. Since the close of the war, Corinth has experienced a substantial and permanent growth. It now contains ten churches, schools and other institutions of learning, several weekly papers, many stores, and manufactures of lumber, woodenware, brooms, etc. Population 1890, 3,000.

CORINTH SHIP CANAL. See CANAL, in these Supplements.

CORINTO, a port of the department of Chinandega, western Nicaragua, 12 miles by rail S. of Chinandega City. It is on a fine harbor, and consequently has an important trade. In the year 1893–94, its exports amounted to 3,642,997 pesos, over two thirds of which was coffee. Pacific Mail steamers touch here. Population, about 2,000.

CORLISS, GEORGE HENRY, the inventor of the Corliss engine. He was born at Easton, New York, July 2, 1817. At an early age, while conducting a general store, he invented a machine for stitching leather. His most important inventions were the improvements in steam-engines, by which uniformity of motion was secured by the method of connecting the governor with the cut-off. This arrangement also prevented waste of steam, so that many of the earlier Corliss engines were sold for the price of the fuel they would save in a given time, which amounted to as high as $4,000 for one engine in one year. In 1844 he founded the Corliss Steam Engine Company, which grew to be, long before his death, the most extensive steam-engine manufactory in the world. Mr. Corliss was a member of the Rhode Island legislature from 1868 to 1870, Centennial Commissioner in 1872, and was a Republican Presidential elector in 1876. He received numerous high honors for mechanical achievements. He died at Providence, Rhode Island, Feb. 21, 1888. See also STEAM-ENGINE, Vol. XXII, pp. 507, 512.

CORNACEÆ, a small family of dicotyledonous plants, chiefly trees and shrubs, of the northern temperate regions. The most common genera of the United States are *Cornus*, whose numerous species are called "cornals" or "dogwoods"; and *Nyssa*, the "tupelo," "pepperidge," or "sour gum tree." The fruit is a drupe or berry, and in some cases edible.

CORN-APHIS (*Aphis granaria*), a plant-louse which is often injurious to corn and wheat crops. See WHEAT, Vol. XXIV, p. 535.

CORN-BEETLE (*Cucujus testaceus*), a minute beetle, whose yellow-colored larva is very destructive to wheat in granaries.

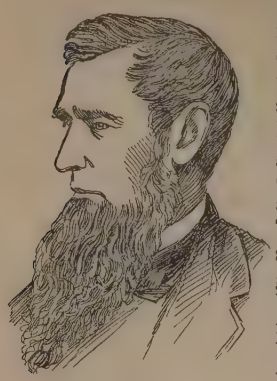
CORNBRASH, a coarse, shelly limestone of the Lower Oölite group in geology. See GEOLOGY, Vol. X, p. 355.

CORN-COCKKLE OR CORN-ROSE (*Lychnis Githago*), a tall weed of the family *Caryophyllaceæ* ("pink family"), a native of Europe or the west of Asia, but now found in many countries. It is a frequent weed among crops of grain, and is well known on account of its large purple flowers, long linear leaves and black seeds.

CORNCRAKE OR LANDRAIL, a bird. See CRAKE, Vol. VI, p. 542; and RAIL, Vol. XX, p. 222.

CORNELL, ALONZO B., son of Ezra Cornell, an American politician; born in Ithaca, New York, Jan. 22, 1832. He became a telegraph operator and manager, and in 1868 a director of the Western Union Telegraph Company. In 1868 he was the Republican candidate for lieutenant-governor of New York, but was defeated. The next year President Grant made him surveyor of customs at New York, and in 1873 he resigned to enter the state assembly, of which he was made speaker. From 1870 to 1878 he was chairman of the state central committee, and in this capacity influenced the New York delegation at Cincinnati in 1876 to vote for Rutherford B. Hayes. In January, 1877, Mr. Cornell was appointed naval officer of the port of New York by General Grant. President Hayes, soon after taking office, demanded that Mr. Cornell should resign from the state and national committees, and as he refused, he was suspended in July, 1878. The collector of the port, Chester A. Arthur, shared the same fate. In 1879 Mr. Cornell was elected governor of New York and served till Dec. 31, 1882. He failed to obtain a renomination.

CORNELL, Ezra, an American philanthropist; born at Westchester Landing, New York, Jan. 11, 1807 He settled in Ithaca in 1828, and conceived and developed the water-power tunnel at Fall Creek. He superintended the establishment of the first telegraph line in America, opened between Baltimore and Washington in 1844. Thereafter he devoted himself to the erection of telegraph lines through the United States, and was the founder of the Western Union Telegraph Company. In 1865 Mr. Cornell founded the University at Ithaca, New York, which bears his name. He died at Ithaca, New York, Dec. 9, 1874.



EZRA CORNELL.

CORNELL COLLEGE, an educational institution at Mount Vernon, Iowa, dating back as far as 1852 for its inception, and to the year 1857 for its collegiate organization. The institution is sectarian, being conducted under the auspices of the Methodist Episcopal Church. The college buildings consist of an art hall, a science hall, Bowman Hall, and the main college building of brick and a Gothic chapel of stone construction. In addition to the four regular courses, namely, classical, philosophical, scientific and civil-engineering, there are preparatory, normal, art and musical departments. The faculty consists of thirty professors and teachers, and the annual enrollment of students is over five hundred and seventy. An army officer is detailed for the purpose of military instruction. The institution possesses productive funds of $110,000, deriving an income therefrom, and from tuition fees, of $23,850. Co-education of the sexes exists, and the institution is under the presidency of the Rev. Dr. W. F. King. Its high intellectual and religious standards have been noticeable from its early days.

CORNELL UNIVERSITY, a non-sectarian educational institution, picturesquely situated in its grounds of 270 acres, on the high banks of Cayuga Lake, Ithaca, New York. It ranks as one of the principal and abundantly endowed universities in the Union. Chartered in 1865 and 1867 by the legislature of the Empire State, Cornell received the income of an enormous land grant of nine hundred and ninety thousand acres, and the interest on half a million dollars given to the university by the Hon. Ezra Cornell, after whom it is named. To his financial management its present opulence is largely due. The university has received munificent donations, also, from John McGraw, Hiram Sibley, Henry W. Sage, A. S. Barnes and A. D. White. It was opened formally for students in 1868, and has 165 professors and teachers shaping the studies of 1,688 pupils, all under the presidency of Jacob G. Schurman, D.Sc., LL.D. It includes a college of agriculture, the Sibley College of Mechanical and Electrical Engineering, the School of Law, and has departments of architecture, arts, philosophy, science and letters. Co-education has existed since 1872. Fifteen fellowships and thirteen scholarships are awarded annually.

CORNELL UNIVERSITY.

CORNER. In the vernacular of the commercial world, a corner is an existing shortage in any particular stock or commodity, brought about by the preconcerted purchase, by one or more parties, of such stock or commodity in such quantities as practically to preclude others from buying on the open market. The result of this is to place all outsiders at the mercy of the cornerer, who thus is enabled to dictate his own terms of sale.

CORNET, a wind-instrument. See Zincken, Vol. XXIV, pp. 787, 788.

CORN-FLOWER, a name given to *Centaurea Cyanus*, a star-thistle of the family *Compositæ*. It is a native of Europe, but is cultivated in gardens and runs wild in the United States. It is cottony, with linear stem leaves, a solitary long-stalked head of large blue flowers, varying to white and rose-color. It also is called "bluebottle."

CORN-HARVESTERS. See Harvesting Machinery, in these Supplements.

CORNIFEROUS, a period in geology to which belongs the corniferous limestone. This latter extends from near the Hudson, in eastern New York, westward through the state, and at the Niagara River forms the rapids at Black Rock. It also occurs in Ohio, northern Michigan, Illinois, Kentucky, eastern Iowa and Missouri. The limestone is commonly light gray to bluish or buff; occasionally it is blackish and rough, from the abundance of hornstone masses which are left projecting by surface wear. See also Geology, Vol. X, p. 345.

CORNING, a town and the capital of Adams County, southwestern Iowa, 73 miles S.W. of Des Moines; on the Nodaway River, and on the Chicago, Burlington and Quincy railroad. Some of the industries of the town are fruit-canning, cheese and butter making, flour-milling, stone-quarrying and brick-making. Population 1895, 1,769.

CORNING, an important town of Steuben County, western central New York, and one of the capitals of the county, pleasantly situated on the Chemung River, about 17 miles W. of Elmira, on the Fall Brook and New York, Lake Erie and Western

railroads. It has excellent educational facilities, and contains a variety of manufactories, including flint-glass and railroad cars. Population 1890, 8,550.

CORNISH DIALECT. See CELTIC LITERATURE, Vol. V, p. 298.

CORN, MAIZE OR INDIAN CORN. Corn, as usually applied, is a generic name for all seeds used in making bread, especially the seeds of cerealia. In England, corn means wheat, rye, oats or barley; in Scotland, oats; and in the United States, maize. As to all these matters, see AGRICULTURE, in these Supplements; and MAIZE, Vol. XV, p. 309.

CORN-MOTH (*Tinea Granella*), a small species of moth, very destructive to grain-sheaves in the field and stored grain, among which it lays its eggs. The larva, which, for its voraciousness, is known as "the wolf," eats into the grain and joins it together by a web. Frequent turning is resorted to for the destruction of the eggs and larva, and salt is mixed with grain for the same purpose.

CORNPLANTER, a half-breed Seneca Indian, chief of the Six Nations. He was born about 1732, and is said to have been the son of John Abeel, a white trader. He sided with the French as against the English and colonists, whose implacable foe he was during the Revolution. With peace concluded with England, Cornplanter was politic and made friends with the United States. He died in Warren County, Pennsylvania, Feb. 18, 1836, and the state of Pennsylvania erected a monument to his memory in 1867. Cornplanter was of considerable intelligence and moral worth.

CORNSNAKE (*Coluber guttatus*), a small brown non-venomous snake found in the southern United States.

CORNO, MONTE OR GRAN SASSO D' ITALIA, a mountain in southern Italy, the culminating peak of the Apennines. See APENNINES, Vol. II, p. 170; and ITALY, Vol. XIII, p. 437.

CORNS. See SKIN DISEASES, Vol. XXII, p. 121.

CORNU, MARIE ALFRED, a French scientist; born March 6, 1841. In 1867 he was appointed professor of physics at the École Polytechnique, and succeeded Becquerel as member of the Academy of Science; received the Rumford medal of the Royal Society of London. He was president of the French Association for the Advancement of Science, and was decorated with the Legion of Honor. Professor Cornu's researches have chiefly been devoted to optical subjects. He was one of the first living authorities upon light, and gave to measurements of the velocity of light a precision which was previously impossible. His principal experiments upon this subject are recorded in the annals of the Paris Observatory; many of his other papers are in the *Comptes Rendus*, and deal with crystalline reflexion, the reversal of the lines in the spectrum of metallic vapors, the spectra of the aurora borealis and the normal solar spectrum.

CORNWALL, a town and port of entry of Cornwall and Storment County, eastern Ontario, at the mouth of the Cornwall canal, and separated by the St. Lawrence from New York state. It is on the Grand Trunk railway, 67 miles S.W. of Montreal. It has abundant water-power for factories of woolen and cotton fabrics, paper-mills, flouring-mills, etc. Population 1891, 6,805.

CORN-WEEVIL, a wheat-pest. See WHEAT, Vol. XXIV, p. 536.

CORN-WORM (*Heliothis armigera*), a name applied to the larva of a moth, also known as boll-worm. The larva feeds on corn, cotton, tomato and other plants. Some years almost one fourth of the cotton-crop in the southern United States has been destroyed by this worm. It is called boll-worm because it begins its ravages by destroying the young bolls, or fruit, of the cotton-plant, later eating the plant itself.

CORŒBUS, the name of a semi-mythical Greek athlete who is said to have won the principal foot-race at the Olympian games in 776 B.C. The Olympian era dated from this victory. See CHRONOLOGY, Vol. V, p. 711.

CORONA BOREALIS, a small and bright constellation near Hercules. It is visible in the northern hemisphere from May till July, near the zenith, in the shape of a semicircle of small but brilliant stars.

CORONADO, a celebrated summer and winter resort of San Diego County, California, situated on the Pacific Coast, near San Diego, and just north of the Mexican boundary line. It is noted for its medicinal spring, its fine bathing facilities, its exhilarating climate and its magnificent scenery. The springs are sulpho-carbonated sodic.

CORONADO, FRANCISCO VASQUEZ DE, a noted Spanish explorer; born in Salamanca, Spain, about 1510. In 1539 he started to explore the northern regions of Florida, intelligence of which had been brought by Cabeza de Vaca. He sailed from Culiacan, on the Pacific coast, in April, 1540, explored the whole of the present state of Sonora, in Mexico, and traveled up the Gila valley. He then penetrated the country of the Little Colorado, visiting the famed seven cities of Cibola, the villages of the Pueblo Indians, and from there marched as far as Gran Quivira, near lat. 34° N., and about 170 miles from El Paso, Texas. On his return journey he is said to have fallen from his horse and to have become insane. Coronado is remarkable as the leader of the first expedition which met with the American bison, or buffalo, and as the first to explore or view the prairies and plains of New Mexico. He died in 1542. See also COLORADO, Vol. VI, p. 163; NEBRASKA, Vol. XVII, p. 309; and NEW MEXICO Vol. XVII, p. 401.

CORONATION GULF, an inlet of the Arctic Ocean, in British North America, forming the south-east part of the land-locked and isle-studded bay that receives the Coppermine River. Lat. 68° 30′ N., long. 46° 52′ W.

CORONELLA, a genus of small, non-venomous serpents of the family *Colubridæ*, having a somewhat compressed and pentagonal body, and rather long, conical tail. They inhabit the warm and temperate parts of the world.

CORONER. The gradual progress of codification and revision of statute law in England brought the office and duties of a coroner within t' e contemplation of Parliament in 1890. A Coroner's Ac

was passed, abolishing many useless and obsolete incidents of the office, clearly defining the duties of a coroner, and codifying, within the brief limits of a single statute, the common-law decisions in relation to the office, which previously had reposed in the midst of hundreds of dusty volumes evolved by 850 years of English jurisprudence and its proverbially slow progress. See also CORONER, Vol. VI, p. 430.

CORPANCHO, MANUEL NICHOLAS, a Peruvian poet; born in Lima, Dec. 5, 1830; died Sept. 13, 1863. See PERU, Vol. XVIII, p. 676.

CORPUS CHRISTI, a city and the capital of Nueces County, southern Texas, on the Mexican National railroad. It is on Corpus Christi Bay, and has a harbor unsurpassed by any on the coast. It is the terminus of the San Antonio and Aransas Pass railroad, and is the center of a large and growing commerce. Population 1890, 4,387.

CORPUSCULAR THEORY OF LIGHT. See LIGHT, Vol. XIV, p 580.

CORPUS DELICTI, a term used in criminal law, signifying the substance of a crime, or the actual fact that a crime has been committed as charged. Thus in the case of murder, the fact of the death of the victim and that the crime charged against the accused had actually been committed by some one, is called the *corpus delicti;* and without proof of this fact, no matter how suspicious the other circumstances, such as the disappearance of the victim, the known hatred of the accused toward him, or other actuating motives, the opportunity for the commission of the crime, or the innumerable other incriminating circumstances, a conviction of murder would not be justified. The fact that the person was killed as charged must always be proved. The fact that, after the accused has been convicted and put to death, the supposed victim has in several instances made his appearance alive, makes the wisdom of the rule apparent. The rule that the *corpus delicti* must be proved applies to other crimes. Under a charge of larceny this proof is supplied when proof of the felonious taking has been made.

CORRIGAN, MICHAEL AUGUSTINE, an American Roman Catholic prelate; born at Newark, New Jersey, Aug. 13, 1839. He was ordained to the priesthood at Rome in 1863. After filling for a few years the chair of dogmatic theology and sacred scripture at Seton Hall College, Orange, New Jersey, he became its president in 1868. In 1873 he was appointed by Pius IX to the See of Newark, and in 1880 was made coadjutor to Cardinal McCloskey, archbishop of New York, under the title of Archbishop of Petra, and on the death of the Cardinal in 1885 he became metropolitan of the diocese of New York, receiving the pallium shortly afterward.

ARCHBISHOP CORRIGAN.

CORRY, a city of Erie County, northwestern Pennsylvania, 26 miles E.S.E. of Erie, on the New York, Lake Erie and Western, the Pennsylvania, and the Western New York and Pennsylvania railroads. It has a large number of manufactories, among them boring-machine factories, locomotive and car shops, boiler-works and numerous other machine-shops. The town has electric lights, water and gas works. Population 1890, 5,677.

CORSE, JOHN MURRAY, an American soldier; born in Pittsburg, Pennsylvania, April 27, 1835; entered the army as major of volunteers in August, 1861, fought at Chickasaw and Missionary Ridge, and was wounded severely at Allatoona. He was brevetted major-general, May 5, 1864; was collector of internal revenue in Chicago, 1867–69, and postmaster of Boston in 1886–90. He died in Winchester, Mass., April 27, 1893.

CORSICANA, a flourishing city and railroad center, and the capital of Navarro County, east central Texas. It has several seminaries and the State Orphan Asylum, and manufactories of flour, ice, brick and carriages, and foundries and planing-mills. It ships cotton, grain, wool and hides. Population 1890, 6,285.

CORSITE. See CORSYTE, in these Supplements.

CORSNED OR CORSNÆD. See ORDEAL, Vol. XVII, p. 819.

CORSON, HIRAM, an American educator and man of letters; born in Philadelphia in 1828. He was for some years an assistant in the Library of Congress and Smithsonian Institution; was appointed professor in history and rhetoric in Girard College in 1865, and in St. John's College, Annapolis, Maryland, in 1866. In 1870 he became professor of English language and literature in Cornell University. His published works include an edition of Chaucer's *Legende of Goode Women; A Thesaurus of Early English; An Introduction to the Study of Browning;* and *A Handbook of Anglo-Saxon and Early English.*

CORSYTE, a term in geology to describe certain eruptive rocks found in Corsica and the Shetland Isles. It also is called Orbicular Dioryte, and consists of anorthite and hornblende, with some quartz and biotite.

CORTLAND, a railroad junction and the county seat of Cortland County, New York, 37 miles S. of Syracuse. It has a state normal school, an academy and numerous manufactories, among them factories for wire-drawing and wire-weaving, omnibus and wagon factories, stove-works, carshops, etc. Population 1890, 8,590.

CORUMBA, a city of the state of Matto Grosso, central western Brazil, on the west bank of the Paraguay River, 164 miles S.S.W. of Cuyaba. It was of little importance until the river was opened to navigation in 1856; then it became the port of entry of the state, and all the commerce of this vast region passed through it. In addition to this, it has a considerable trade with Bolivia. Population, about 5,000.

CORUNDUM. See EMERY, Vol. VIII, p. 171.

CORUNNA, a city and the capital of Shiawassee County, southeastern central Michigan, on the Shiawassee River, and on the Michigan Central,

Ann Arbor, and Detroit, Grand Haven and Milwaukee railroads, 75 miles N.W. of Detroit. It has flouring and woolen-mills, coal-mines and large sandstone-quarries. Population 1895, 1,551.

CORVALLIS, a thriving town and capital of Benton County, central western Oregon, situated on the west bank of the Willamette River, at its juncture with St. Mary's River, about 30 miles S. of Salem. It is the seat of the State Agricultural College. It is the center of a rich agricultural region, and, having two railroads, the Oregon Central and Eastern and the Southern Pacific, and steamboat service for two thirds of the year, it enjoys a large shipping trade, especially in wheat. Population 1890, 1,527.

CORVIDÆ. See CROW, Vol. VI, p. 617.

CORWEN ("the white choir"), a town in Merionethshire, North Wales, on a height overlooking the Dee, 10 miles W. of Llangollen. It is said to be the place to which Owen Glendower retreated when Henry IV invaded and overran Wales, and tradition points out his tomb in the parish churchyard. The Great Western railway has a station in the town. Population, 2,646.

CORWIN, THOMAS, an American statesman; born in Bourbon County, Kentucky, July 29, 1794. His father removed to Lebanon, Ohio, and served in the legislature. After working on the farm until he was about twenty years of age, he studied law and was admitted to the bar in 1818. He served in the Ohio legislature from 1822 till 1829, was chosen to Congress as a Whig in 1830, and was re-elected until 1840, when he resigned to become the Whig candidate for governor of Ohio, which office he held for one term. In 1844 he was elected to the United States Senate, where he opposed the annexation of Texas, and in 1847 delivered a notable speech against the war with Mexico. He was appointed, by President Fillmore, Secretary of the Treasury in 1850, and after his service there returned to the practice of law in Lebanon. In 1858 he was elected to Congress as a Republican, and was re-elected in 1860. President Lincoln appointed him minister to Mexico in 1861; but, on the arrival of Maximilian, he returned to Washington and practiced law. He had much reputation as an orator. See the *Life and Speeches of Thomas Corwin*, edited by Isaac Strohn (Dayton, 1859). He died in Washington, District of Columbia, Dec. 18, 1865.

THOMAS CORWIN.

CORYDON, a town and the capital of Harrison County, southeastern Indiana, and former capital of the state, situated on Indian Creek, 115 miles S. of Indianapolis, and on the Louisville, New Albany and Corydon railroad. It is the seat of an academy, contains various manufactories, and is noted for its sulphur spring. Population, 880.

CORYDON, a town and the capital of Wayne County, central southern Iowa, 61 miles S. of Des Moines, on the Keokuk and Western railroad. Population 1895, 1,058.

CORYMB. See BOTANY, Vol. IV, pp. 122, 123.

CORYMBUS, a mode of dressing the hair among the Greeks by tying it in a cluster or knot on the top of the head. The hair often was covered with a sort of open ornamental work. The name was also given to the cluster of ivy leaves, garlands or berries with which Greek vases were encircled, and to the high sterns of ships.

CORYPHA, a genus of tropical Asiatic palms, with very large fan-shaped leaves and a terminal inflorescence. *C. umbraculifera* is the talipot of Ceylon.

CORYPHENE (*Coryphæna*), a genus of fishes of the family *Coryphænidæ*. This family comprises the fishes known as dolphins, related to the mackerels. Most of them exhibit brilliant, iridescent colors. Some of them are excellent as food. Two species are sometimes found along the Atlantic coast of the United States.

CORYPHODON. See MAMMALIA, Vol. XV, p. 426.

COSCINOMANCY, a form of divination practiced in early times by suspending a sieve from the point of a pair of shears. See DIVINATION, Vol. VII, p. 293.

COSEGUINA OR COSIGÜINA. The mountain is three thousand feet in height, and occupies a promontory on the south side of the Gulf of Fonseca, in the department of Chinandega. See NICARAGUA, Vol. XVII, p. 477.

COSHOCTON, the capital of Coshocton County, eastern central Ohio. It lies on the Muskingum River, and on the Ohio canal, 26 miles N. of Zanesville, on the Cleveland, Canton and Southern and Pittsburg, Cincinnati, Chicago and St. Louis railroads. It has a paper-mill and iron and steel works. Population 1890, 3,672.

COSTA, ISAAC DA, a Dutch poet and religious writer; born at Amsterdam in 1798; died in 1860. In his twentieth year he acquired the degree of LL.D., and, embracing Christianity, was baptized. This subjected him to considerable persecution, which, however, subsided as his genius gradually gained recognition. The most interesting of his writings are his translation of Byron's *Cain; Harmony of the Gospel;* etc. His *Battle of Nieuwpoort*, the last of his poems, is one of his masterpieces.

COSTA, SIR MICHAEL, an English musician and composer; born in Naples, Feb. 4, 1810. He was sent to the Conservatoire in his native city for education, where he greatly distinguished himself. In 1830 he was appointed conductor of music in the Italian Opera, London, an office which, in 1847, he resigned for a similar one in the Royal Italian Opera, Covent Garden. His oratorios of *Eli* and *Naaman* have often been performed, but have little merit. He was knighted by Queen Victoria in 1869, and received the Royal Order of Frederick from the King of Würtemberg. Died in England Apr. 29, 1884.

COSTANOAN INDIANS. A name sometimes applied to the coast tribes of California converted by the Jesuits. See CALIFORNIA, Vol. IV, p. 1694.

COSTA RICA (República de Costa Rica), the southernmost republic of Central America. (See Costa Rica, Vol. VI, pp. 449–451.) The legislative power is vested in a single chamber of 21 representatives—one for each ten thousand inhabitants—the members of which serve for four years, one half retiring every two years. The President is elected for four years in the same manner, the present occupant of the office being Señor Don Rafael Iglesias, whose term expires May 8, 1898. Official statistics make the area of the republic 23,000 square miles, but geographers deny that it exceeds 20,980 square miles. The census of Feb. 18, 1892, showed a population of 243,205, of whom 122,480 were males and 120,725 females. Of these, 3,500 were Indians in a savage state. In 1896 the republic took the unusual course, for a South American republic, of declaring against a silver monetary standard, and of adopting a gold standard. As regards commerce, the development of the coffee industry has made Costa Rica one of the richest countries, for its size, in the world. The revenue of the republic in 1894 was $4,300,000, and the expenditures $4,700,000; foreign debt, $10,000,000. The chief exports are coffee, bananas and sugar. Valuable metals exist in various parts of the country, and the mining industry is making progress. In 1892 there were 180 miles of railway and 630 miles of telegraph. Education is compulsory and free. In 1892 there were 272 primary schools with 15,000 pupils, besides 90 private schools with 2,500 pupils. The army consists of 600 men in time of peace, and on a war-footing commands 35,000 militia, as every male between 18 and 50 is bound to serve. The imports for 1893 amounted to 5,833,427 pesos, and the exports to 9,619,064 pesos. To facilitate agricultural operations and immigration, a concession has been granted for an agricultural bank with a capital of $5,000,000. The bank makes advances on the security of lands and produce, and will bring out colonists and settle them on lands ceded to the company. In 1896 Costa Rica adopted the single gold monetary standard.

COSTMARY ("plant of Mary") *Tanacetum Balsamita*), a perennial plant of the family *Compositæ*, a native of the south of Europe, long cultivated in gardens for the agreeable fragrance of its leaves.

COSTROMA or KOSTROMA, a town and the capital of the province of Costroma, central European Russia, situated at the confluence of the Costroma with the Volga. It has manufactories of linen, leather, soap and Prussian blue. Population, 27,178.

COSWAY, Richard, a noted English artist; born at Tiverton, Devonshire, in 1740. As a miniature-painter he was particularly famous, and gained the patronage of most of the nobility of his time. Many of his works were distinguished by great delicacy of treatment and correctness of detail. He died in London, July 4, 1821.

COTA-CACHI, a mountain in the western Cordillera of the Andes, in the northern part of Ecuador, 60 miles N. of Quito. It is 16,453 feet high, and has on its southern slope a lake, the Cuy-cocha, which is 10,200 feet above sea-level. It is one of the highest lakes in the world. The mountain is of volcanic origin and shows marks of violent earthquakes; it has, however, no crater at its summit, though the lake occupies a former one. It is very difficult of ascent.

COTES, Mrs. Everard (pen name, Sara Jeannette Duncan), a Canadian novelist and writer of travels and descriptive sketches; born in Brantford, Ontario, Canada, in 1863, and educated at the Collegiate Institute of that city. She was the daughter of Charles Duncan, a merchant of Brantford, and made her *début* as a writer in the *Canadian Monthly* of Toronto. During the years 1883–88 she wrote largely for the Canadian newspaper and periodical press, including the Toronto *Globe*, *The Week* and the Montreal *Star*, and was for a time a newspaper correspondent at Washington, District of Columbia. She early developed a felicitous prose style, which gave charm to her social and literary contributions, which at this period appeared under the *nom de plume* of "Garth Grafton." In 1888 she made a tour of the world in the interest of a Canadian literary syndicate, accompanied by a fellow-journalist, Lilian Lewis, a young lady of Montreal. The result of this tour is embodied in her first production, *A Social Departure; or, How Theodocia and I Went Round the World.* The work, which appeared simultaneously in England and America in 1890, was first contributed to the London *Ladies' Pictorial*, by whose artist staff it was delightfully illustrated. This was quickly followed (for *A Social Departure* was a gratifying success) by *An American Girl in London* (1891). In 1893 appeared *The Simple Adventures of a Mem-Sahib*, and in the following year *A Daughter of To-day* and *Vernon's Aunt.* In 1895 two further works came from her pen, *The Story of Sonny Sahib* and *His Honor and a Lady.* The latter, a clever, realistic novel of Anglo-Indian life, appeared serially in the *Pall Mall Magazine*, and in book-form was also issued on both sides of the Atlantic. All of Mrs. Cotes's productions show the working of a bright and original mind. She is gifted with a fine perception of the eccentricities and weaknesses of human nature, and a pervasive humor. She has also great facility in portraying character and sketching lightly scenes and incidents in social life. In 1890 she married Everard Cotes, a scientist in the East India Company's service, and made her home in Calcutta, India.

G. Mercer Adam.

COTGRAVE, Randle, an English lexicographer, of whose life little is known save that he was a native of Cheshire, and was admitted scholar of St. John's College, Cambridge, in 1587; became secretary to William Cecil, Lord Burghley, and was living as late as 1632, and died probably in 1634. He was author of our earliest French dictionary (1611), a remarkable book for its time, and still of value to the philologist, as it fixes the actual forms of French words at the time when they were borrowed.

COTINGA, a genus of birds of the family *Cotingidæ*, found in tropical regions of America. They are remarkable for their splendid and bright-colored plumage and curious ornamentation.

COTONEASTER, a genus of *Rosaceæ*, closely al-

lied to the hawthorn and medlar. The species are shrubs or small trees, some evergreen, with simple entire leaves, more or less woolly beneath, small flowers in lateral cynes, and small, unpalatable bright-colored fruit, persistent in winter. *C. vulgaris* and other species are common mountain plants of central Europe and Asia. They are all adapted for shrubberies, are hardy and are common in England. See ARBORICULTURE, Vol. II, p. 320.

COTTA, BERNHARD VON, a German geologist; born in the Thüringerwald, Oct. 24, 1808. His father was a director in the academy at Tharand, and there young Cotta received his early education. Later he studied mineralogy at Heidelberg. In 1842 he became professor at Freiburg. His most important work was the preparation of a map of the structural geology of Saxony, published in twelve sections. He wrote mainly of the geology of his own country. Died at Freiburg, Sept. 14, 1879.

COTTAGE CITY, a summer resort of Massachusetts and a noted camp-meeting ground, situated on the northeast shore of Martha's Vineyard, about thirty miles from New Bedford. Population 1895, 1,038.

COTTEREAU, JEAN, the leader of the CHOUANS; q.v., Vol. V, p. 686.

COTTIDÆ, a family of shore fishes inhabiting the Arctic regions. See ICHTHYOLOGY, Vol. XII, p. 690.

COTTING, JOHN RUGGLES, an American scientist; born in Acton, Massachusetts, in 1787; was educated at Harvard and Dartmouth medical schools; then devoted his time to the study of chemistry and allied sciences. In 1835 went to Augusta, Georgia, and made a geological survey of two counties; afterward started a survey of the whole state, but failed through lack of financial support; published *Introduction to Chemistry* (1822) and *Synopsis of Lectures on Geology* (1825). Died in Milledgeville, Georgia, Oct. 13, 1867.

COTTON. See COTTON, Vol. VI, pp. 482–508; and AGRICULTURE, in these Supplements.

COTTON, JAMES SUTHERLAND, an English writer and editor; born in the Madras presidency, July 17, 1847; educated at Winchester and Oxford; called to the bar in 1874; assistant to Sir W. W. Hunter, the great English authority on Indian affairs; the author of several Indian blue-books; contributed to this ENCYCLOPÆDIA and *Leslie Stephen's Dictionary of National Biography;* edited *The Academy*, and conducted an annual containing important acts of Parliament, entitled *Paterson's Practical Statutes.*

COTTON, JOHN, an American divine; born in Derby, England, Dec. 4, 1585; entered Trinity College, Cambridge, at the age of 13, obtaining a fellowship at Emmanuel College, where he gained a high reputation for learning; about 1612 became minister at Boston, in Lincolnshire, when his Puritan ideas imbibed at college brought him into disfavor with Bishop Laud. Cotton removed to London, and from there to Boston, Massachusetts, where he was chosen pastor of the first church of Boston, organized in 1630. This connection he kept up until his death. Cotton wrote nearly fifty books, all published in England. He was chosen by the general court of New England to draw up an abstract of the laws of Moses for use in the colony; but it was not adopted, a revised form supposed to have been the work of Cotton and Sir Henry Vane being afterward adopted and printed. He died in Boston, Dec. 23, 1652.

COTTON-GRASS, a popular name for the genus *Eriophorum*, plants of the family *Cyperaceæ*, common in swampy land. It has spikes resembling tufts of cotton, and the cottony substance has been used for stuffing pillows, making candle-wicks, etc.

COTTON-RAT (*Sigmodon hispidus*), a rodent resembling the Norway rat, common in the cotton-fields of the southern United States.

COTTONSEED AND COTTONSEED-OIL, products from the cotton plant, of which there are several species. The best-known and most valuable are the *Gossypium Barbadense*, *G. Herbaceum*, and others. The seed has an irregular, oval form, and measures about one sixth by one third of an inch. As it comes from the cotton-gin, there clings to it a delicate linty fiber. An average of 22 pounds of short lint is ordinarily taken from a ton of seed. This product, called linters, brings from 6½ to 7 cents a pound, and is used principally in the manufacture of cotton batting. The hulls of the seed are used as fuel for the engines which furnish the power for the mills extracting the oil. It is estimated generally that three to four bushels of seed will afford one bushel of hulls, while the average percentage of oil is put at 15 to 20 per cent, and sometimes as high as 25 per cent.

The cotton plant has been known for hundreds of years, but no use was made of its products, except the fiber from the boll, until a very late period. It has been demonstrated that every part of the plant is valuable, and available in many ways. The fiber of the plant-stalk can be made into a coarse bagging of great strength; the root is susceptible of use in dyeing and pharmacy; the seeds are valuable in many ways besides the production of oil; and the oil is growing more and more valuable as its peculiar properties are developed. The utilization of cottonseed was attempted in 1770, and samples of oil were exhibited by the Moravian brotherhood in Bethlehem, Pennsylvania. Before that time the seed had been regarded worthless, and the majority of planters allowed it to rot on the ground. Some few had discovered its nutritive qualities, and utilized it as food for their cattle, sheep and horses, although horses did not take to it as kindly as the other stock. By some it was fed raw, while others boiled it for their animals, but the great majority disposed of the accumulations of seed-piles by digging furrow-trenches and burying the refuse seeds in the rows, over which the next crop of cotton would be planted. For ages the seed was but a waste product and cumbered the premises.

The use of cottonseed-meal as food for horses and other stock is increasing largely from year to year. In its composition it is similar to the flat beans which form so important an item of horse-feed in England. But it is a highly concentrated food, and great caution is necessary in its use. It is sprinkled on cut and dampened hay, straw or corn fodder, not more than half a pound of the meal at

first, increasing slowly until the amount is four pounds, or even more, per day, for a horse of ten hundred to eleven hundred pounds.

Cottonseed-meal free from hulls contains about seven per cent of nitrogen. The hulls are especially rich in potash, the ashes of the hulls having 36 or more per cent of potash in them. Acid phosphate supplies from 10 to 18 per cent of phosphoric acid. A mixture of the phosphate, cottonseed and the ashes of the hulls, which are procured at the oil-mills, or the hulls themselves in compost, would be a complete fertilizer for any crop. As watermelons do not require potash in larger quantity than the soil of South Carolina naturally contains, a mixture of the cotton-meal and the phosphate would make a good fertilizer for that crop.

In 1875 the Society for Encouragement of Arts and Commerce offered a prize for the manufacture of cottonseed-oil on a commercial scale; in 1851 specimens of oil and cake were placed in the English exhibition; in 1852 cottonseed-oil was exported from Egypt to France; in 1820 a patent was granted in the United States on a process for extracting the oil from the seed; in 1834 the first attempts to extract oil as a merchantable product were made at Natchez, Mississippi; in 1855 L. Klapp produced a decorticating-machine which separated the hulls from the kernels, and since that time the production of oil has become an enormous industry. The seed, after being cleared of the adhering lint, is passed into a decorticating or hulling machine, in which the seed is cut open by knives of steel or chilled iron. A solid cylinder armed with the knives revolves within a second cylinder, also armed with knives, playing in opposition. Revolving wire screens separate the kernels from the hulls. The hulls are crushed between iron rollers, and are then ready for the pressing. The first oil product is thick and turbid, and has a deep brown-red color and a slimy sediment. Subsequent processes produce the following grades: Crude oil, summer yellow, summer white, winter yellow and winter white.

Cottonseed-oil consists chiefly of palmetin and olein. The elementary composition is given as,—

Carbon	76.4%
Hydrogen	11.4%
Oxygen	12.2%
Specific gravity at 60° F.	0.922°–0.930°

The refined oil has been introduced largely into general use for various purposes, including its substitution, when highly refined, for olive-oil in table use. It is used largely as a substitute for lard, known as "cottolene," being cheaper, more delicate, preserving its sweetness longer and involving less risk of injury to health. It also is used in the manufacture of butterine.

In the arts, cottonseed-oil stands midway between the drying and the non-drying oils. In its drying properties it is inferior to linseed-oil. It is used as an adulterant or as a substitute for various oils, such as linseed, sperm, lard, olive, almond, etc., also for treating leather, in dressing wool, as a lubricator, an illuminant, and in soap-making. It is stated officially that nine tenths of the salad-oil in use in the United States consists wholly of cottonseed-oil. In 1881–82 the Italian government put a high import duty upon it, evidently with the intention of preventing the adulteration of olive-oil.

One hundred pounds of cottonseed will afford an average of—

	Pounds.
Lint and hulls	46
Cake	38
Crude oil	16
	100

The cake is an extremely important product. It contains, when prepared from the hulled seed—

	Parts.
Moisture	9
Albuminoids	43
Oil	15
Crude fiber	4
Other constituents	22
Mineral matter	7
	100

Cows fed with meal made from the cake show an improvement in the quantity and quality of milk, and beef is improved greatly; but for cows carrying young its free use is not deemed advisable, it being productive of miscarriage. In 1881, 150,000 barrels of oil were exported, three quarters of which were shipped to France and Mediterranean ports. The home consumption is estimated at from forty thousand to sixty thousand barrels per annum. The value of the cake is put at about six million dollars annually. In 1889–90 the oil produced in the United States was valued at $12,386,305, and the lint, hulls and oil-cake at $11,860,509.

COTTONWOOD FALLS, a city and the capital of Chase County, eastern central Kansas, 66 miles S.W. of Topeka, on the Cottonwood River, and on the Atchison, Topeka and Santa Fé railroad. The vicinity is a forest and grain-raising district, and the river gives good power for flour and lumber mills. Population 1895, 780.

COTTONWOOD SPRINGS, a popular health and pleasure resort of Chaffee County, central Colorado, about six miles S.W. of Buena Vista. It is noted for its medicinal springs and for its charming scenery.

COTTONWOOD TREE. See POPLAR, Vol. XIX, p. 512.

COTTON-WORM, a common name for the larva of an owlet-moth (*Aletia argillacea*). The depredations of this larva in some years cause an enormous financial loss to the cotton growers of America. Full accounts of the worm are given in several government reports published in the United States.

COTULLA, a town and the capital of La Salle County, southern Texas, 86 miles by rail S.S.W. of San Antonio, on the Nueces River, and on the International and Great Northern railroad. Industry, grazing. Population, 1,016.

COUCH-GRASS (*Triticum repens*), a species of grass common in Europe and North America, known to farmers as a troublesome weed; it spreads over the field with great rapidity, and on account of its tenacity of life is eradicated with difficulty. The roots are sweet and mucilaginous, and are collected at Naples for feeding horses.

COUCY, Renaud, Châtelain de, a court poet belonging to the north of France, who flourished in the latter part of the twelfth century. He became a Crusader; it is supposed that he accompanied Philippe Auguste and Richard Cœur de Lion to the Holy Land, probably in the service of Raoul Sieur de Coucy, with whom he often is confounded. His poems were songs of passion, distinguished for their ardor and animation. They are preserved in the *Chansons du Châtelain de Courcy*, by F. Michel, Paris.

COUDERSPORT, a borough and the capital of Potter County, central northern Pennsylvania, 64 miles N.W. of Williamsport, on the Allegheny River, and on the Coudersport and Port Allegheny railroad. It has a tannery, a foundry and several mills. Population 1890, 1,530.

COUES, Elliott, an American naturalist; born in Portsmouth, New Hampshire, Sept. 2, 1842; graduated from Columbian University, Washington, District of Columbia, in 1861, and entered the United States army in 1862 as medical cadet, and from 1864 to 1881 was assistant surgeon. He was, in 1869, professor of comparative anatomy at Norwich University, Vermont, and in 1873 surgeon and naturalist in the United States Northern Boundary Commission. Subsequently he was collaborator at the Smithsonian Institution; secretary and naturalist to the United States geological and geographical survey of the territories; professor of anatomy in the National Medical College; and professor of biology in the Virginia Agricultural and Mechanical College. He wrote many papers on scientific subjects. His fame rests mainly on his work in the field of ornithology, and a number of volumes of value on this subject attest his labors. Among his publications are *Key to North American Birds* (1872–87); *Field Ornithology* (1874); *Birds of the Colorado Valley* (1879); *New England Bird Life* (1881); *The Dæmon of Darwin* (1885); etc. Professor Coues made a study of theosophy, joined the Theosophical Society, and until Mme. Blavatsky's death in 1891 was an aggressive skeptic of her supernatural pretensions.

ELLIOTT COUES.

COULANGES, Numa Denis Fustel de, a French essayist; born in Paris, March 18, 1830. He became a professor of history in the University of Strasburg in 1859, and in 1879 a professor at the Sorbonne. His published essays are principally on historical subjects. His history of serfdom in France, *Recherches sur Quelques Problèmes d' Histoire*, is the best authority on the subject extant, and its discussions throughout are founded on original sources.

COULDOCK, Charles Walter, an English actor; born in London, England, April 26, 1815; first appeared on the stage in 1835, and came to this country in 1849. He supported Charles Kean and Macready, and played in the United States, creating the part of Dunstan Kirk in *Hazel Kirk*. In his eightieth year he was an active participant in stage representations, and admired greatly in old men's parts. Died in New York, Nov. 27, 1898.

COULTER, John Merle, an American botanist and university president; born in Ningpo, China, Nov. 20, 1851, of American parentage; graduated from Hanover College, Indiana, where, after spending two years with the Hayden government survey, he became professor of natural science. In 1879 he went to Wabash College as professor of biology, and in 1891 was elected president of Indiana University, from which he had received the doctorate of laws. From 1893 to 1896 he was president of Lake Forest University, and in the latter year went to the University of Chicago as head professor of botany. He has written many lectures on educational topics, in addition to numerous botanical publications, among which are *Synopsis of the Flora of Colorado* (with Prof. J. C. Porter); *Manual of Rocky Mountain Botany; Handbook of Plant Dissection; Manual of the Botany of Western Texas;* and *Gray's Manual of Botany* (6th ed.). He was the founder (1875) of the *Botanical Gazette*. The botanical subjects in these Supplements were prepared under the editorship of Professor Coulter.

COUNCIL BLUFFS, a city of southwestern Iowa and capital of Pottawattamie County. The city was incorporated in 1853 and is now the largest city in the western part of the state. It contains a fine courthouse and other county buildings, a Roman Catholic seminary, a high school, several graded schools, and a state institution for deaf mutes, founded in 1855. Two iron railway and wagon bridges, each about a mile in length, span the Missouri and connect the city with Omaha. Its manufactories produce iron, paper, agricultural implements, machinery, carriages, etc., and it has an extensive wholesale trade. Population 1880, 18,063; 1890, 21,388. The population, including the suburbs, is estimated at over 40,000. See Council Bluffs, Vol. VI, p. 512.

COUNCIL GROVE, the capital of Morris County, eastern central Kansas, 51 miles S.W. of Topeka, located on the Neosho River, and on the Missouri Pacific and the Missouri, Kansas and Texas railroads, 24 miles N.W. of Emporia. It is one of the oldest towns in the state, and was named from the grove where former Indian councils were held by the pioneer settlers. It has flour-mills, broom factories, canning factories, etc. It is a large shipping-point for grain and cattle. Population 1895, 2,145.

COUNCILMAN, William Thomas, an American physician; born Jan. 2, 1854, in Pikesville, Maryland; educated at the University of Maryland, and became professor of pathological anatomy in Harvard Medical College (1893). He wrote numerous works, including *A Study of Inflammation* (1879); *On Fibrous Tubercle* (in German, 1881); *On the Ætiology of Malaria* (1884); *Syphilis of the Lungs* (1890); etc.

COUNCIL OF THE INDIES was created by King Ferdinand in 1511, for the regulation of all Spanish colonial affairs. Bishop Fonseca (q.v., in these Supplements) was its first chief, and exercised great influence over its members, opposing Colum-

bus, Cortes and others. The powers of the council became much enlarged in the time of Charles V, until its powers extended over all branches of colonial administration. It could nominate and remove viceroys and governors and ecclesiastical functionaries, enacted and approved all laws relating to the colonies, appointed the audiences which were the supreme courts in all criminal cases, and had control over all affairs relating to the Indians. Its seat was removed to Madrid after the first few years of its existence, and it represented the crown in all affairs relating to America and the Indies, and was subject only to the sovereign.

COUNTERFEITING is the act of imitating or copying anything with the intent of fraudulently passing off the copy as original and genuine. Under the provisions of the Revised Statutes of the United States many illegal acts are classed as counterfeiting. Counterfeiting the signature of any person to obtain the approval, allowance or payment of a claim against the government, when done by a person in the military or naval service of the United States, subjects the convicted person to such punishment as a court-martial may fix. Counterfeiting any instrument in writing concerning lands, mines or minerals within the state of California is also made a felony, punishable by imprisonment for not less than three years or more than ten years, and a maximum fine of $10,000, or both. It is also made an offense to counterfeit, alter or reuse the revenue stamps designed to be placed on packages of fermented liquor or wine made in imitation of sparkling wine or champagne, as well as stamps for use on proprietary medicines. Sections 5414–5416 provide that every person who, with intent to defraud, falsely makes, forges or counterfeits any obligation or security of the United States shall be punished by a fine of not more than $5,000, and imprisoned at hard labor for not more than 15 years; counterfeiting the circulating notes used by any banking association, a penalty of from 5 to 15 years' imprisonment and a maximum fine of $1,000; counterfeiting letters patent, a maximum fine of $5,000 and imprisonment not to exceed 10 years. The counterfeiting of any certificate of entry required by any officer of the customs is punishable by a fine of not more than $10,000 and imprisonment for not more than three years. To counterfeit any bid, proposal, guaranty, official bond, public record, affidavit or other writing, for the purpose of defrauding the United States, subjects the convicted person to a fine of not less than $1,000 and imprisonment for not more than ten years, or both. The seal or signature of an official of the United States is protected from being counterfeited by the provisions of section 5419, which imposes a penalty of from $500 to $5,000 fine and not more than five years' imprisonment. Other subjects of counterfeiting are military bounty land-warrants, power of attorney, order, certificate or receipt, and protection is also given to ship's papers, custom-house documents, naturalization papers and other papers pertaining to the naturalization of aliens, the penalties being very heavy. The coin of the United States and foreign countries is protected under section 5457, which provides against the counterfeiting of any coin or bars in resemblance or similitude of the gold or silver coins current. It also provides against the bringing into the United States of any such counterfeit money. The maximum penalty is $5,000 fine and ten years' imprisonment. Section 5458 provides against the counterfeiting of the minor coins; one, two, three and five cent pieces are additionally protected by section 5462, the penalty on conviction being a fine of not more than $1,000 and imprisonment for not more than five years. Section 5463 prohibits the counterfeiting of postal money-orders; 5464 covers the counterfeiting of postage stamps, and 5465 protects foreign stamps. Counterfeiting any key suited to any lock adopted by the post-office department subjects the offender to imprisonment at hard labor for a period of not more than ten years. The statutes also provide that any person who makes, aids in making, or causes to be made, or has in his possession with fraudulent intent, or permits to be used, any die, hub or mold of any substance whatever, in likeness of any die, hub or mold, used for coining United States coins, shall be fined not more than $5,000, or imprisoned at hard labor for not more than ten years, or both. In the case of foreign coins, the fine is $2,000 and the imprisonment five years, or both. All counterfeits and implements are confiscated by the government, and officers, when authorized by United States judges or commissioners, may enter any place, in the daytime only, to search for the same. For the purpose of keeping the counterfeiting of money as much in check as possible, the territory of the United States is divided into ten districts, and experienced secret-service officers are constantly engaged in ferreting out counterfeiters and suppressing the business. Congress provides for the support of the service by annual appropriations, which are expended under the direction of the Secretary of the Treasury. The South and West are the sections most infested with counterfeiters, and much more work is done in counterfeiting coin than bank or treasury notes. The vigorous crusade of the government officials in recent years has done much to stamp out this nefarious business, and but little counterfeiting is now done in the United States.

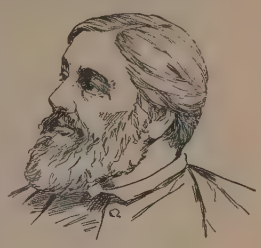
COUNTER-IRRITANT, a substance used to produce local inflammation or congestion upon the surface of the body, for the purpose of relieving some internal inflammation or congestion. It is generally applied to a part of the surface at some distance from the diseased organ. The counter-irritant causes the blood to flow in increased quantities to the part to which it is applied, which results in lessening the flow of blood through the diseased part, thus reducing its congestion or inflammation. Counter-irritants that simply redden the skin are called rubefacients, as mustard, red pepper, turpentine; those that blister, epispastics, as cantharides, ammonia, croton-oil; and those that actually destroy the tissues with which they come in contact, caustics, as silver nitrate, caustic potash, caustic soda, etc. The cautery, in the form of a red-hot iron, or a wire heated by passing through it a current of electricity, is also used.

COUNTY COUNCILS, a system of local government established in England and Wales by the Local Government Act of 1888, by which all duties relating to strictly local matters that were formerly performed by the justices in quarter sessions were transferred to the county councils, which were brought into existence by the act. For the purpose of the establishment of these councils, what are termed administrative counties were formed. The powers and duties of the councils refer to county finance, rating and assessment, county buildings, bridges, lunatic asylums, reformatories, registration and polling of Parliamentary electors, cattle diseases, the appointment of coroners, the maintenance of highways, preventing the pollution of rivers, and many other matters of minor importance. The police is under the joint management of the councils and the courts of quarter sessions. In regard to finances, the councils have the power of levying county and other rates, and they receive a share in certain licenses collected by the imperial government, and also a proportion of the probate duties.

The most interesting of all the councils is the London county council. London is an administrative county, covering an area of 121 square miles; and has absorbed, so far as ratable value is concerned, about seven eighths of Middlesex, about two thirds of Surrey and about one third of Kent counties. In it the city of London is an electoral division. The administrative county of London includes within its limits the county of the city of London and the county of London—that is, the metropolis outside the city of London proper—the two latter being counties for such non-administrative purposes only as quarter sessions, justices, etc. Such matters as require the consideration of both the administrative and non-administrative county are referred to the "standing joint committee" of the London county council and the London quarter sessions. In that the administrative county of London has no jurisdiction over the police, it differs from other county councils. The council comprises a chairman, 19 aldermen and 118 councilors—in all, 138. The term of office for each alderman is six years, and nine or ten retire every three years. The councilors are elected for three years. The functions of these two classes of members are the same except as to term of service. The councilors are elected directly by the rate-payers; the councilors elect the aldermen. Among some of the more important works accomplished by the council are the clearing of large, unhealthy areas and rebuilding thereon suitable artisan houses. The council has established a model lodging-house, capable of accommodating 324 men, located at Parker Street, Drury Lane. The most important work has been the Thames tunnel at Blackwell (see BINNIE, ALEXANDER R., in these Supplements). The free ferry at Woolwich and the rebuilding of the Vauxhall bridge are other improvements undertaken by the council. See also LOCAL GOVERNMENT, ENGLAND AND LONDON, in these Supplements.

COUPLE, the name given in statics to a pair of equal forces acting on the same body in opposite and parallel directions. The effect of a couple is to rotate the body about a certain definite line (the axis) perpendicular to the plane in which the forces constituting the couple lie.

COURBET, GUSTAVE, a French painter; born at Ornans, in Franche-Comté; died at Vevay, Switzerland, Dec. 31, 1877. The son of well-to-do farmers in the Jura region, he manifested early dispositions toward art; he received his education at Besançon, and when 20 years old, was sent to Paris to study law. But he abandoned everything for painting. He soon showed himself refractory to the influence of any of the leading teachers of his time, and struck boldly forward on the road toward realism, open-air art and impressionism. His first attempts to present his views of nature as he saw it, with an exuberance of light-and-shade effects unknown up to his day, were mockingly received, and in 1855, at the time of the first Paris exposition, he had to build his own exhibition-rooms close to the main entrance to the world's fair grounds. He was quite well known already, and admired by many, but his fame was of slow growth, and his rather boisterous ways of advertising himself were a hindrance to a deserved recognition. A bitter enemy of the second empire, he was not even satisfied with the republic of 1870, but joined the Paris Commune, in hopes of helping the triumph of socialism. In a foolish moment he urged the pulling down of the Colonne Vendôme. His participation in this act of vandalism caused him to be sentenced to prison and a heavy fine, the amount of which was used to rebuild the column, every fragment of which was recovered.



GUSTAVE COURBET.

His recognition as one of the masters of modern landscape-painting is not discussed any longer. Two of his masterpieces adorn the National Museum of the Luxembourg, and the influence of his truthful, vivid and intensely original representation of nature is strongly felt among the present generation of landscape-painters. A list of his more prominent works include *After Dinner at Ornana* (1849); *The Interment at Ornans* (1850); *The Stone-Breakers* (1851); *Woman with a Parrot, and Deer at the Brook of Plaisirs-Fontaine, Doubs* (1866); *The Charity Beggar; Deer, Springtime* (1868); *The Stag-Whoop; Siesta in the Haying Season* (1869); *The Stormy Sea; The Beach at Étretat After a Storm* (1870). Among his works that have been purchased and come to the United States are *La Curée; Rocks on the Coast; Woman with a Parrot; Young Woman of the Seine;* and *Doe Run Down in the Snow.*

COURG OR CURG, a province of south India. See COORG, Vol. VI, p. 341.

COURLAN OR LIMPKIN, the common names of the rail-like birds of the family ARAMIDÆ; q.v., in these Supplements.

COURTHOPE, WILLIAM JOHN, an English author; born in 1842 at Malling Vicarage, near Lewes, Sussex, England; educated at Harrow School and at

railroad. It has saw-mills, fertilizer-works and cotton-compresses. Population 1890, 1,067.

COWBIRD OR COW-BUNTING, a bird of the genus *Molothrus*, and of the blackbird family, found in the United States. Like the Old World cuckoos, they deposit their eggs in the nests of other birds. The eggs are incubated, and the young cowbirds reared by the foster-parents. The cowbirds associate with cattle, probably to secure the insects which infest the animals.

COWELL, EDWARD BYLES, a Sanscrit scholar; born at Ipswich, England, Jan. 23, 1826. He was educated at Oxford, and resided some years in India, after which he returned to England, and soon after was appointed professor of Sanscrit at the University of Cambridge. He made voluminous translations from the Sanscrit, and as a commentator stands unrivaled. He is the author of the *Prákrit Grammar*, in Sanskrit and English, and of numerous works relating to Sanskrit.

COWEN, FREDERIC HYMEN, one of the most popular of English song-composers, was born in Kingston, Jamaica, Jan. 29, 1852. From an early age he was a pupil of Sir Julius Benedict and Sir John Goss, and further studied at Leipsic and Berlin. He produced an opera, *Pauline;* an oratorio, *The Deluge;* several cantatas, and works in other styles of music. Apart from a few of his songs, his most esteemed productions are his cantatas, *The Rose Maiden* and *The Sleeping Beauty.* His oratorio, *Ruth*, was produced at the Worcester festival, Sept., 1887; his cantata, *The Water Lily*, at the Norwich festival in 1893; his *Signa*, at Milan, Italy, Nov., 1893; and his *Ode to the Passions* (cantata), at Leeds, Oct., 1898.

COWEN, JOSEPH, eldest son of Sir Joseph Cowen, was born at Blayden Brows, Durham, England, in 1831, and educated at the University of Edinburgh. In early life he was the intimate friend of Mazzini, Garibaldi, Kossuth, Herzen and other political exiles. He became unceasing in his advocacy of the cause of the oppressed European nationalities. To aid their propaganda he established a private press, at which their revolutionary manifestos were printed and then smuggled into Italy, Hungary and Poland. He was identified intimately and actively with the different Garibaldian expeditions to establish a free and united Italy, and with Langiewicz's unsuccessful effort for Polish independence. He was elected to Parliament for Newcastle-on-Tyne in 1873 (on the death of his father), representing that constituency until 1886. He was one of the pioneers of co-operation, and in Parliament brought forward many progressive measures. The proprietor of the Newcastle *Daily Chronicle*, an influential organ in the north of England, to which he himself has contributed, he did not seek, after 1886, to re-enter Parliament, but devoted himself to political writing.

COWHAGE OR COWITCH, a name primarily applied to the brittle barbed hairs that cover the pods of *Mucuna pruriens*, a West Indian leguminous plant. These hairs, suspended in syrup, are used as a vermifuge. The name has also been applied to other plants with hispid capsules, as *Acidoton urens*, of the family *Euphorbiaceæ*, and *Tragia volubilis*, of the same family, both West Indian plants.

COWLEY, HENRY RICHARD CHARLES WELLESLEY, EARL, born June 17, 1804; died July 14, 1884. He was successively secretary and ambassador at Constantinople, minister plenipotentiary to Switzerland (1848), to the German Confederation (1851), and in 1852 he became ambassador at Paris. He was created Earl Cowley in 1857, and was made a knight of the Garter in 1866.

COW-PARSNIP, the common name of species of *Heracleum*, a genus of *Umbelliferæ*, and growing in the north temperate regions of both hemispheres. They are tall, strong-scented plants, with compound leaves, white or pinkish flowers (unusually large for the family) and flat-winged fruits. *H. lanatum* is the common species of the United States, a very stout plant, growing in damp, rich ground.

COWPENS, a village of Spartanburg County, northwestern South Carolina, nine miles N.E. of Spartanburg. It is important as the battlefield where General Morgan's forces defeated Tarleton's, on Jan. 17, 1781, capturing many stores, over 500 prisoners, and that with a loss of but 12 killed and 60 wounded. It is now a village of about 400 people, but has four churches, a high school and a cotton-mill.

COW-PLANT (*Gymnema lactifera*), a perennial plant of the family *Asclepiadaceæ*, a native of Ceylon. The milky juice is said to be used as a substitute for milk by the Singhalese.

COWPOX INOCULATION. See JENNER, Vol. XIII, p. 623.

COWSLIP. See PRIMROSE, Vol. XIX, p. 737.

COW'S MILK, in the United States. See AGRICULTURE, in these Supplements.

COW TREE, a name given to a number of trees of different families, the juice of which is used instead of milk. The most famous of these is the Palo-de-Vaca (*Brosimum galactodendron*), of the Cordilleras and Caracas, a plant of the family *Urticaceæ*. The milk is obtained by piercing the bark of the trunk or branches. It has an agreeable taste, somewhat like that of cow's milk, and its nutritive value is considerable. It is much used by the negroes and Indians.

COW-WHEAT, the common name of *Melampyrum*, a genus of plants of the family *Scrophulariaceæ*, having an oblong two-celled capsule, with a few seeds somewhat resembling grains of wheat.

COX, SIR GEORGE WILLIAM, an English clergyman and historian; born in 1827. He was ordained in 1850, and for several years was a curate. In 1860 he became assistant master in Cheltenham College. He has written several valuable histories and works on mythology, among which are *Tales of Ancient Greece; Mythology of the Aryan Nations; Lives of Greek Statesmen; Life of Bishop Colenso; History of Greece;* etc. He also contributed many articles to this ENCYCLOPÆDIA.

COX, ISAAC N., a merchant of Ellenville, New York; born in Tallsburg, New York, Aug. 1, 1846. He received an academic education. A Democrat,

he was elected a supervisor of his town in 1875 and 1883–86, being chairman of the board the latter year; was a member of the Democratic State Committee; in 1890 was elected a Representative from the seventeenth Congressional district of New York to the Congress of 1891–93.

COX, Jacob Dolson, an American statesman; born in Montreal, Oct. 27, 1828; was admitted to the bar in 1853, and settled in Warren, Ohio. From 1859 to 1861 he was a member of the state senate, and held a state commission as brigadier-general of militia. At the beginning of the Civil War he entered the Union army, and was present in many important battles. In 1863 he was commissioned major-general. He was governor of Ohio in 1866–67, and Secretary of the Interior in 1869–70. He was elected president of the Wabash railroad in 1873, and from 1877 to 1879 was a member of Congress. In 1885 he became president of the Cincinnati University. General Cox has published *Atlanta* (1882), *The March to the Sea* (1882), etc.

COX, Kenyon, an American artist, son of the preceding; born at Warren, Ohio, Oct. 26, 1856; studied three years in Cincinnati; went to Philadelphia in 1876, and next year to Paris, where he was a student of Carolus Duran and of Cabanel and Gérôme at the École des Beaux Arts, where he remained three years, and then returned to America, locating his studio in New York City. He became a member of the American Society of Artists in 1882, and later its secretary, and won the second Hallgarten prize, National Academy of Design, in 1888. As an illustrator he is seen to advantage in his designs for Rossetti's *The Blessed Damozel.*

KENYON COX.

COX, Palmer, an American artist; born at Granby, Quebec, in 1840. He went to San Francisco, contributing to magazines there for fourteen years, and removed to New York City in 1875. He became noted for his artistic "Brownies," which had considerable popularity. He was an author as well, and combined the two arts in his publications, which include *Squibs; or, Every-Day Life Illustrated* (1874); *Hans von Petter's Trip to Gotham, in Pen and Pencil* (1878); *How Columbus Found America* (1878); *That Stanley* (1878); *The Brownies, Their Book* (1887); *Queer People, Such as Goblins, Giants, Merry-Men and Monarchs, and Their Kweer Kapers* (1888); *Queer Peoples with Paws and Claws* (1888); *Queer People with Wings and Stings* (1888); *Comic Yarns in Verse, Prose and Picture* (1889); *Another Brownie Book* (1890); *The Brownies at Home* (1893); *The Brownies Around the World* (1894); and *The Brownies Through the Union* (1895).

COX, Samuel, an English Baptist minister; born at London, April 19, 1826. In 1851 he became pastor of the church in St. Paul's Square, Southsea, and in 1855 went to Ryde. After he had been at this last-named place about four years, his health failed him, and he virtually gave up preaching and devoted himself to authorship. In 1875 he founded the *Expositor*, which he edited till 1884. He also wrote numerous treatises and several books expounding the various books of the Bible. As a Bible expositor he had no superior. Among his publications are *The Secret of Life* (1866); *The Private Letters of St. Paul and St. John* (1867); *The Quest of the Chief Good* (1868); *The Resurrection* (1869); *An Expositor's Note-Book* (1872); *Biblical Expositions* (1874); *The Book of Ruth* (1876); *Salvator Mundi* (1877); *The Larger Hope*, a sequel to the preceding (1883); *Balaam* (1884); *Miracles* (1884); *The House and Its Builder* (1888). His best-known work was *Salvator Mundi.* He died at Hastings, March 29, 1893.

COX, Samuel Hanson, an American clergyman; born at Rahway, New Jersey, Aug. 25, 1793. He studied law in 1812, but later studied theology, and in 1817 was ordained pastor at Mendham, New Jersey. In 1821 he settled in New York. He was pastor of various Presbyterian churches in that city, and took a leading part in the establishment of the University of the City of New York. In 1833 he visited Europe, and delivered a series of lectures. In 1834 he became professor of pastoral theology in the Theological Seminary at Auburn, and in 1837 was made pastor of the First Presbyterian congregation in Brooklyn. He was for years connected with the faculty of the Union Theological Seminary of New York City. He was a strong advocate of the antislavery movement and of temperance reform, and was the author of *Quakerism not Christianity.* He died at Bronxville, New York, Oct. 2, 1881.

COX, Samuel Sullivan, an American statesman; born at Zanesville, Ohio, Sept. 30, 1824. He graduated at Brown University in 1846. In 1853 he became the editor of the Columbus, Ohio, *Statesman.* His sobriquet of "Sunset," which clung to him through life, originated from a flowery description of a sunset published in this paper. He became secretary of legation at Lima in 1856. From 1857 to 1865 he was a member of Congress. In 1866 he became a resident of New York City, and in 1868 was elected to Congress, and re-elected three times. In 1872 he was elected as candidate-at-large for the state, and re-elected in 1874, 1876, 1878 and 1880. In 1885 he was made minister to Turkey, but returned to the United States in October of the following year, and in November was again elected to Congress. He was twice re-elected, and was a member of the House of Representatives at the time of his death. He was the founder of the life-saving service, and the author of several works on political and other subjects. He was an able debater and a man of great humor. His best-known books are *A Buckeye Abroad* (1862); *Eight Years in Congress* (1865); *Why We Laugh* (1876); and *Three Decades of Federal Legislation* (1885). Died Sept. 10, 1889.

COXALGIA. See Hip-Joint Disease, in these Supplements.

COXE, Arthur Cleveland, an American churchman; born at Mendham, New Jersey, May 10, 1818, died at Clifton Springs, New York, July 20,

railroad. It has saw-mills, fertilizer-works and cotton-compresses. Population 1890, 1,067.

COWBIRD OR COW-BUNTING, a bird of the genus *Molothrus*, and of the blackbird family, found in the United States. Like the Old World cuckoos, they deposit their eggs in the nests of other birds. The eggs are incubated, and the young cowbirds reared by the foster-parents. The cowbirds associate with cattle, probably to secure the insects which infest the animals.

COWELL, EDWARD BYLES, a Sanscrit scholar; born at Ipswich, England, Jan. 23, 1826. He was educated at Oxford, and resided some years in India, after which he returned to England, and soon after was appointed professor of Sanscrit at the University of Cambridge. He made voluminous translations from the Sanscrit, and as a commentator stands unrivaled. He is the author of the *Prâkrit Grammar*, in Sanskrit and English, and of numerous works relating to Sanskrit.

COWEN, FREDERIC HYMEN, one of the most popular of English song-composers, was born in Kingston, Jamaica, Jan. 29, 1852. From an early age he was a pupil of Sir Julius Benedict and Sir John Goss, and further studied at Leipsic and Berlin. He produced an opera, *Pauline;* an oratorio, *The Deluge;* several cantatas, and works in other styles of music. Apart from a few of his songs, his most esteemed productions are his cantatas, *The Rose Maiden* and *The Sleeping Beauty.* His oratorio, *Ruth*, was produced at the Worcester festival, Sept., 1887; his cantata, *The Water Lily*, at the Norwich festival in 1893; his *Signa*, at Milan, Italy, Nov., 1893; and his *Ode to the Passions* (cantata), at Leeds, Oct., 1898.

COWEN, JOSEPH, eldest son of Sir Joseph Cowen, was born at Blayden Brows, Durham, England, in 1831, and educated at the University of Edinburgh. In early life he was the intimate friend of Mazzini, Garibaldi, Kossuth, Herzen and other political exiles. He became unceasing in his advocacy of the cause of the oppressed European nationalities. To aid their propaganda he established a private press, at which their revolutionary manifestos were printed and then smuggled into Italy, Hungary and Poland. He was identified intimately and actively with the different Garibaldian expeditions to establish a free and united Italy, and with Langiewicz's unsuccessful effort for Polish independence. He was elected to Parliament for Newcastle-on-Tyne in 1873 (on the death of his father), representing that constituency until 1886. He was one of the pioneers of co-operation, and in Parliament brought forward many progressive measures. The proprietor of the Newcastle *Daily Chronicle*, an influential organ in the north of England, to which he himself has contributed, he did not seek, after 1886, to re-enter Parliament, but devoted himself to political writing.

COWHAGE OR COWITCH, a name primarily applied to the brittle barbed hairs that cover the pods of *Mucuna pruriens*, a West Indian leguminous plant. These hairs, suspended in syrup, are used as a vermifuge. The name has also been applied to other plants with hispid capsules, as *Acidoton urens*, of the family *Euphorbiaceæ*, and *Tragia volubilis*, of the same family, both West Indian plants.

COWLEY, HENRY RICHARD CHARLES WELLESLEY, EARL, born June 17, 1804; died July 14, 1884. He was successively secretary and ambassador at Constantinople, minister plenipotentiary to Switzerland (1848), to the German Confederation (1851), and in 1852 he became ambassador at Paris. He was created Earl Cowley in 1857, and was made a knight of the Garter in 1866.

COW-PARSNIP, the common name of species of *Heracleum*, a genus of *Umbelliferæ*, and growing in the north temperate regions of both hemispheres. They are tall, strong-scented plants, with compound leaves, white or pinkish flowers (unusually large for the family) and flat-winged fruits. *H. lanatum* is the common species of the United States, a very stout plant, growing in damp, rich ground.

COWPENS, a village of Spartanburg County, northwestern South Carolina, nine miles N.E. of Spartanburg. It is important as the battlefield where General Morgan's forces defeated Tarleton's, on Jan. 17, 1781, capturing many stores, over 500 prisoners, and that with a loss of but 12 killed and 60 wounded. It is now a village of about 400 people, but has four churches, a high school and a cotton-mill.

COW-PLANT (*Gymnema lactifera*), a perennial plant of the family *Asclepiadaceæ*, a native of Ceylon. The milky juice is said to be used as a substitute for milk by the Singhalese.

COWPOX INOCULATION. See JENNER, Vol. XIII, p. 623.

COWSLIP. See PRIMROSE, Vol. XIX, p. 737.

COW'S MILK, in the United States. See AGRICULTURE, in these Supplements.

COW TREE, a name given to a number of trees of different families, the juice of which is used instead of milk. The most famous of these is the Palo-de-Vaca (*Brosimum galactodendron*), of the Cordilleras and Caracas, a plant of the family *Urticaceæ*. The milk is obtained by piercing the bark of the trunk or branches. It has an agreeable taste, somewhat like that of cow's milk, and its nutritive value is considerable. It is much used by the negroes and Indians.

COW-WHEAT, the common name of *Melampyrum*, a genus of plants of the family *Scrophulariaceæ*, having an oblong two-celled capsule, with a few seeds somewhat resembling grains of wheat.

COX, SIR GEORGE WILLIAM, an English clergyman and historian; born in 1827. He was ordained in 1850, and for several years was a curate. In 1860 he became assistant master in Cheltenham College. He has written several valuable histories and works on mythology, among which are *Tales of Ancient Greece; Mythology of the Aryan Nations; Lives of Greek Statesmen; Life of Bishop Colenso; History of Greece;* etc. He also contributed many articles to this ENCYCLOPÆDIA.

COX, ISAAC N., a merchant of Ellenville, New York; born in Tallsburg, New York, Aug. 1, 1846. He received an academic education. A Democrat,

he was elected a supervisor of his town in 1875 and 1883–86, being chairman of the board the latter year; was a member of the Democratic State Committee; in 1890 was elected a Representative from the seventeenth Congressional district of New York to the Congress of 1891–93.

COX, Jacob Dolson, an American statesman; born in Montreal, Oct. 27, 1828; was admitted to the bar in 1853, and settled in Warren, Ohio. From 1859 to 1861 he was a member of the state senate, and held a state commission as brigadier-general of militia. At the beginning of the Civil War he entered the Union army, and was present in many important battles. In 1863 he was commissioned major-general. He was governor of Ohio in 1866–67, and Secretary of the Interior in 1869–70. He was elected president of the Wabash railroad in 1873, and from 1877 to 1879 was a member of Congress. In 1885 he became president of the Cincinnati University. General Cox has published *Atlanta* (1882), *The March to the Sea* (1882), etc.

COX, Kenyon, an American artist, son of the preceding; born at Warren, Ohio, Oct. 26, 1856; studied three years in Cincinnati; went to Philadelphia in 1876, and next year to Paris, where he was a student of Carolus Duran and of Cabanel and Gérôme at the École des Beaux Arts, where he remained three years, and then returned to America, locating his studio in New York City. He became a member of the American Society of Artists in 1882, and later its secretary, and won the second Hallgarten prize, National Academy of Design, in 1888. As an illustrator he is seen to advantage in his designs for Rossetti's *The Blessed Damozel.*

KENYON COX.

COX, Palmer, an American artist; born at Granby, Quebec, in 1840. He went to San Francisco, contributing to magazines there for fourteen years, and removed to New York City in 1875. He became noted for his artistic "Brownies," which had considerable popularity. He was an author as well, and combined the two arts in his publications, which include *Squibs; or, Every-Day Life Illustrated* (1874); *Hans von Petter's Trip to Gotham, in Pen and Pencil* (1878); *How Columbus Found America* (1878); *That Stanley* (1878); *The Brownies, Their Book* (1887); *Queer People, Such as Goblins, Giants, Merry-Men and Monarchs, and Their Kweer Kapers* (1888); *Queer Peoples with Paws and Claws* (1888); *Queer People with Wings and Stings* (1888); *Comic Yarns in Verse, Prose and Picture* (1889); *Another Brownie Book* (1890); *The Brownies at Home* (1893); *The Brownies Around the World* (1894); and *The Brownies Through the Union* (1895).

COX, Samuel, an English Baptist minister; born at London, April 19, 1826. In 1851 he became pastor of the church in St. Paul's Square, Southsea, and in 1855 went to Ryde. After he had been at this last-named place about four years, his health failed him, and he virtually gave up preaching and devoted himself to authorship. In 1875 he founded the *Expositor*, which he edited till 1884. He also wrote numerous treatises and several books expounding the various books of the Bible. As a Bible expositor he had no superior. Among his publications are *The Secret of Life* (1866); *The Private Letters of St. Paul and St. John* (1867); *The Quest of the Chief Good* (1868); *The Resurrection* (1869); *An Expositor's Note-Book* (1872); *Biblical Expositions* (1874); *The Book of Ruth* (1876); *Salvator Mundi* (1877); *The Larger Hope*, a sequel to the preceding (1883); *Balaam* (1884); *Miracles* (1884); *The House and Its Builder* (1888). His best-known work was *Salvator Mundi.* He died at Hastings, March 29, 1893.

COX, Samuel Hanson, an American clergyman; born at Rahway, New Jersey, Aug. 25, 1793. He studied law in 1812, but later studied theology, and in 1817 was ordained pastor at Mendham, New Jersey. In 1821 he settled in New York. He was pastor of various Presbyterian churches in that city, and took a leading part in the establishment of the University of the City of New York. In 1833 he visited Europe, and delivered a series of lectures. In 1834 he became professor of pastoral theology in the Theological Seminary at Auburn, and in 1837 was made pastor of the First Presbyterian congregation in Brooklyn. He was for years connected with the faculty of the Union Theological Seminary of New York City. He was a strong advocate of the antislavery movement and of temperance reform, and was the author of *Quakerism not Christianity.* He died at Bronxville, New York, Oct. 2, 1881.

COX, Samuel Sullivan, an American statesman; born at Zanesville, Ohio, Sept. 30, 1824. He graduated at Brown University in 1846. In 1853 he became the editor of the Columbus, Ohio, *Statesman.* His sobriquet of "Sunset," which clung to him through life, originated from a flowery description of a sunset published in this paper. He became secretary of legation at Lima in 1856. From 1857 to 1865 he was a member of Congress. In 1866 he became a resident of New York City, and in 1868 was elected to Congress, and re-elected three times. In 1872 he was elected as candidate-at-large for the state, and re-elected in 1874, 1876, 1878 and 1880. In 1885 he was made minister to Turkey, but returned to the United States in October of the following year, and in November was again elected to Congress. He was twice re-elected, and was a member of the House of Representatives at the time of his death. He was the founder of the life-saving service, and the author of several works on political and other subjects. He was an able debater and a man of great humor. His best-known books are *A Buckeye Abroad* (1862); *Eight Years in Congress* (1865); *Why We Laugh* (1876); and *Three Decades of Federal Legislation* (1885). Died Sept. 10, 1889.

COXALGIA. See Hip-Joint Disease, in these Supplements.

COXE, Arthur Cleveland, an American churchman; born at Mendham, New Jersey, May 10, 1818, died at Clifton Springs, New York, July 20,

1896. He studied theology at the General Theological Seminary of the Protestant Episcopal Church, took orders in 1841, and the following year was made priest. From 1843 to 1854 he was rector of St. John's Church, in Hartford, Connecticut, and then of Grace Church, Baltimore, Maryland. In 1863 he accepted the rectorship of Calvary Church, New York City, and a year later became assistant bishop of western New York. In 1865 he succeeded Bishop De Lancey as the second bishop of western New York. Bishop Coxe has published extensively in both prose and verse. In 1885 he founded the Christian Literature Company, and edited nine volumes of their series of *Ante-Nicene Fathers* and *St. Augustine on the Psalms*. He lectured at the University of Michigan and at Kenyon College, and in 1892 was Paddock lecturer in New York. Among his later works are *The Episcopate of the West* and a poem on Westminster Abbey.

BISHOP COXE.

COXE, John Redman, an American physician, was born in Trenton, New Jersey, in 1773. He studied medicine in the United States and in Europe, and in 1796 settled in Philadelphia. For several years he was a physician in the Pennsylvania Hospital, and later in the Philadelphia Dispensary. In 1809 he became professor of chemistry in the University of Pennsylvania, and from 1818 to 1835 was professor of materia medica and pharmacy in the same institution. Dr. Coxe was the first physician to practice vaccination in Philadelphia. He published many works on medicine and kindred subjects, among them being *American Dispensatory* (1827) and *Refutation of Harvey's Claim to the Discovery of the Circulation of the Blood* (1834). He died in Philadelphia, March 22, 1864.

COXE, Tench, an American politician and political economist; born at Philadelphia, May 22, 1755, of a noted family. He was educated in his native town. In 1776 he left the militia, in which he had been enrolled, joined the royalists and entered Philadelphia with Lord Howe, after whose retirement he was arrested and paroled. He then became a Whig, and in 1788 was sent to the Continental Congress. He was next a member of the Federal and Republican parties, and held offices under Adams and Jefferson. He was the first to advocate the growing of cotton in the South, and was the first to attempt to bring an Arkwright machine to the United States. His published works include *Address on American Manufactures; Inquiry into the Principles of a Commercial System for the United Provinces* (1789); *View of the United States of America* (1794); *Thoughts on Naval Power and on the Encouragement of Commerce and Manufactures* (1806); *Memoir on the Cultivation, Trade and Manufacture of Cotton* (1807); *Statement of the Arts and Manufactures of the United States* (1814). He died in Philadelphia, July 17, 1824.

COXEY, Jacob Sechler, an American agitator, was born in Pennsylvania in 1854, and commenced life at the age of 13, in a rolling-mill. In 1881 he became owner of a sandstone-quarry at Massillon, Ohio, and extended his operations in 1889 by becoming a horse-breeder, purchasing a stock-farm near Lexington, Kentucky, afterward removing his stock to Massillon. He was formerly a Greenbacker in politics, but became a Populist, being present at the Populist convention in St. Louis in July, 1896, as a delegate. He claimed to be a "Christian Theosophist." Coxey adopted the advocacy of a scheme of the American Federation of Labor for the issue of five hundred million dollars in bonds (at the rate of twenty million dollars a month) by the Federal government, to be expended in constructing good roads, thus securing employment for those out of work. It was for the purpose of promoting this scheme that the "march to Washington" was designed. The "Commonweal Army," as it was called, started from Massillon, March 25, 1894, with 75 men, and increased as it marched, creating great interest, and Coxey, with his lieutenant, Carl Browne, made a peaceable entry into Washington at the head of 336 men, April 29th, and on May 1st paraded the streets of the capital. Coxey's purpose was to make a demonstration from the steps of the Capitol, which attempt was prevented, as illegal in the manner intended. He made an attempt to do so by trespassing on the grass to reach his desired goal. He was promptly arrested, fined and lodged in jail. The army melted away, though the movement was imitated in different parts of the country.

COXWELL, Henry Tracey, a famous English aëronaut, was born March 2, 1819, at Wouldham, near Rochester. He made his first ascent in 1844, and subsequent ascents with Hampton, Gypson and Gale. In 1848 he turned his attention to military aëronautics, and started from Brussels in a war-balloon to demonstrate a new plan for the dropping of torpedoes. About the time of the Crimean War he invented a system of signaling by semaphore arms. On Sept. 5, 1862, he made his famous ascent with James Glaisher, to make meteorological observations for the British association, the balloon attaining the unprecedented elevation of seven miles. In 1870 Mr. Coxwell was engaged in instructing the Prussians in the art of aëronautics for military purposes. His experiences of 28 years are contained in two volumes, which were published in London in 1889.

COYOTE or PRAIRIE-WOLF. See Prairie-Wolf, in these Supplements.

COYPU, the native name of a large rodent of South America. It resembles the house-rat, but is much larger, being two feet long, including the tail. Formerly it was hunted for its fur.

COZUMEL, an island of Yucatan, 15 miles off the E. coast of the peninsula, lat. 20° 30′ N., long. 86° 59′ W., 24 miles long and 7 wide. It is low and flat, covered with brushwood and forests, about the only occupation of the inhabitants being grazing. It is surrounded by coral reefs and has no good harbor.

CRAB-APPLE, a name given to any small, tart apple, but specially applied to *Pyrus prunifolia* of Siberia and its associates, which are cultivated for

their fruit. The native American crab-apple is *P. coronaria*, a small tree, with bright rose-colored, deliciously fragrant flowers and ovate leaves. Another crab-apple of the southern and western United States is *P. angustifolia*, very much like the last, but differing in its narrow leaves.

CRABRO, a genus of hymenopterous insects of the group of sting-bearers (*Aculeata*). The hornet (*C. vulgaris*) is an example.

CRADDOCK, CHARLES EGBERT. See MURFREE, MARY NOAILLES, in these Supplements.

CRAFTS, WILBUR FISK, an American clergyman and religious writer; born at Fryeburg, Maine, Jan. 12, 1850; graduated at the Wesleyan University, Middletown, Connecticut, in 1869, and at the School of Theology of the Boston University in 1872. He was a Methodist minister from 1872 until 1880, when he became pastor of a Congregational church in Brooklyn, where he remained three years. From 1883 until 1889 he filled the pulpit of the First Union Presbyterian Church, in New York City. He was appointed secretary of the American Sabbath Union, and became editor of the *Christian Statesman* and department editor of the magazine *Our Day*. His works, some of them written conjointly with his wife, formerly Sarah J. Timanus, include *Through the Eye to the Heart* (1873); *Wagons for Eye-Gate* (1874); *Childhood* (1875); *An Ideal Sunday School* (1876); *The Coming Man is the Present Child* (1878); *The Rescue of Child-Soul* (1880); *Successful Men of To-day* (thirty-eighth thousand, 1885); *Must the Old Testament Go?* (1883); *The Sabbath for Man* (1883); *Practical Christian Sociology* (1895); and, with Prof. H. F. Fisk, *Rhetoric Made Racy* (1884).

CRAG AND TAIL, a term used to designate a peculiar hill conformation, in which a bold and precipitous front exists on one aspect of a hill, while the opposite is formed of a sloping declivity. It is believed, in most cases, to have been caused by moving ice.

CRAIG, WILLIS GREENE, an American churchman; born at Danville, Kentucky, Sept. 24, 1834; graduated at Center College in 1851, and received the degree of D.D. there in 1873. He graduated from the Danville Theological Seminary in 1860, and from 1862 to 1882 was pastor of the Westminster Presbyterian Church in Keokuk, Iowa, and from 1882 until 1891 professor of church history in the McCormick Theological Seminary, Chicago, and in 1891 became professor of didactic and polemic theology there. In 1893 he was chosen moderator of the Presbyterian General Assembly, succeeding Dr. W. C. Young.

CRAIGIE, MRS. MARY E., an American authoress; better known by her pseudonym, "John Oliver Hobbes." Among her works are *Once Upon a Time: Stories of Ancient Gods and Heroes* (1876); *Some Emotions and a Moral; A Study in Temptations* (1893); *A Bundle of Life* (1894; 2d. ed. 1895); *The Gods, Some Mortals and Lord Wickenham* (1895); and *The Herb-Moon* (1896).

CRAIK, DINAH MARIA MULOCK, an English novelist; born at Stoke-upon-Trent in 1826. Her first novel, *The Ogilvies*, appeared in 1849, and received some favor, as did tales which immediately followed, particularly *Agatha's Husband* (1852); but it was not until the publication of *John Halifax, Gentleman*, in 1857, that she achieved a decided success. Her other works include *Mistress and Maid* (1863); *A Noble Life* (1866); *Hannah* (1871); etc. She also published a book of *Fugitive Poems* (1860). She received a pension in 1864, and married, in 1865, George Lillie Craik, nephew of the English historian. She died Oct. 12, 1887.

CRAIK, GEORGIANA MARION, an English novelist; born in 1831. In 1886 she married Mr. A. W. May. She wrote for various periodicals, and in 1857 appeared her first novel, *Riverston*, and afterward numerous other books, many of them for children. Among them are *Play-Room Stories* (1862); *Faith Unwin's Ordeal* (1865); *Cousin Trix and Her Tales* (1867); *The Cousin from India* (1871); *Without Kith or Kin* (1871); *Mark Dennison's Charge* (1880); *Twelve Old Friends* (1885); *A Daughter of the People* (1887); etc. Died in St. Leonard's, Nov. 1, 1895.

CRAMBE, a genus of plants of the family *Cruciferæ*, natives of Europe and western Asia. They have been used as a pot-herb from ancient times. The young shoots and blanched leaves are cooked and served like asparagus.

CRAMPTON'S GAP, a pass in the South Mountains, near Burkittsville, Frederick Co., Md. One wing of McClellan's army, under General W. B. Franklin, attacked and defeated the Confederates here, Sept. 14, 1862. The defense, by McLaw's division of Lee's army, was bitter and prolonged, and the loss on both sides severe.

CRANBROOK, GATHORNE GATHORNE-HARDY, EARL OF; born Oct. 1, 1814, at Bradford, Eng.; educated at Shrewsbury and at Oriel College, Oxford; called to the bar in 1840; and in 1856–65 was Conservative M. P. for Leominster. In 1865 he defeated Gladstone in the celebrated Oxford University election. He was Under-Secretary of State for the Home Department (1858–59); president of the Poor Law Board (1866–67); Home Secretary (1867–68); War Secretary (1874–78); Secretary for India (1878–80); and President of the Council (1885–92). In 1892 he was created Earl of Cranbrook and Baron Medway of Hemsted.

CRANCH, CHRISTOPHER PEARSE, an American artist and poet, son of William Cranch, chief justice of the circuit court of the District of Columbia; born at Alexandria, Virginia, March 8, 1813; graduated at Columbian College in 1831 and at the Harvard Divinity School in 1835. He retired from the ministry three years later to devote himself to art, and studied in Paris and in Italy from 1846 until 1863. He became a National Academician in 1864. As an artist he was known by his landscapes, and as an author by his poems. Among his paintings are *Afternoon in October* (1867); *The Washington Oak* (1868); *Venice* (1870); *Venetian Fishing-Boats* (1871); etc. His *Poems* were published in 1844, many of them collected from *The Dial*. He is also the author of some graceful stories for children: *The Last of the Huggermuggers* (1856); *Kobotozo* (1857); and *The Bird and the Bell* (1875). He resided in New York City and Cam-

bridge, Massachusetts, dying at the latter place, Jan. 20, 1892.—His brother, JOHN CRANCH, is also an artist, devoting himself to portrait-painting, and is an associate of the National Academy.

CRANE, STEPHEN, an American novelist, son of Dr. J. T. Crane, a Princeton graduate and Methodist minister, descended from the first Stephen Crane of the family, who came to the United States in 1635. He was born in New York in 1872, and went to Syracuse University and Lafayette College, but studied only in a desultory manner, and drifted from college to newspaper life at the age of 16. At this he worked for several years, during which time he wrote and published, at his own expense, *Maggie, a Girl of the Streets*, which had no sale, but which came under the notice of some of the critics, who wrote of it in such a manner that it was republished after a time. It is a realistic novel of street and slum life. *The Red Badge of Courage* was written before the author had completed his majority, and was published originally by a newspaper syndicate, where it attracted no particular attention. Afterward, when issued by a house of standing, and reprinted in England, it came into notoriety. The story powerfully depicts the career of a raw recruit in battle from his first fear on confronting the foe, and nearing the whistle of shot and shell. This phase of a soldier's experience had never before been attempted by creators of character, and it has been done by Stephen Crane in an extraordinary vivid manner. But this was not the only or whole charm of the author's work. He was able, besides, to describe the battle scenes and tactical evolutions in such a manner as to deceive the British critics, who declared that the descriptions referred to could only have been penned by a veteran scarred in war. The truth was, as the author declared, he had only imagined it all. It is such "imagination" that the reader wants more of. *George's Mother* is a work dealing with city life. It told a story that occurs daily and in many lives.

STEPHEN CRANE.

CRANE, THOMAS FREDERICK, an American scholar and folk-lorist; born at New York City, July 12, 1844; graduated at the College of New Jersey in 1864, and received therefrom the honorary degree of Ph.D. in 1874; was professor of modern languages in Cornell University (1868); of Spanish and Italian in the same (1872); and of Romance languages there (1881). He was one of the founders of the American Folk-Lore Society. In the department of folk-lore he achieved success, his *Italian Popular Tales*, published in Boston and London in 1885, being at once recognized as the only English work to fully represent the folk-tales of Italy, which it does exhaustively. His *Exempla, or Illustrative Stories from the Sermones Vulgares of Jaques de Vitry*, was published in 1890 by the English Folk-Lore Society.

CRANE, WALTER, an English painter and decorative designer; born at Liverpool, England, Aug. 15, 1845; studied under W. J. Linton, the wood-engraver, and was appointed a member of the committee of the General Exhibition of Water-Color Drawings in 1879. He was elected a member of the Institutes of Painters in Water-Colors and Oils in 1882, but resigned in 1886. His principal pictures are *The Renaissance of Venus* (1877); *The Fate of Persephone* (1878); *The Sirens* (1879); *Truth and the Traveler* (1880); *Europa; The Laidley Worm* (1881); *The Roll of Fate* and *Dunstanborough Castle* (1882); *Diana and the Shepherd* (1883); *The Bridge of Life* (1884); *Freedom and Pandora* (1885); *The Chariots of the Hours* (1887); *Sunrise* (1888); *Flora* and *Pegasus* (1889); and *Neptune's Horses* (1892). Mr. Crane has written some attractive poetry, and has also made holiday books. He was instrumental in founding the Arts and Crafts Exhibition in 1888, and was its president. He delivered the Cantor lectures in 1889 on *The Decoration and Illustration of Books*, and was president of the section of applied art at the National Art Congress at Liverpool in the same year. He designed the seal for the London county council; and in 1892 was appointed director of designs at the Manchester Municipal School of Art. In 1892 an exhibition of his works was made in the United States, which he accompanied.

CRANE, WILLIAM CAREY, a Baptist clergyman and educator; born at Richmond, Virginia, in 1816, died in 1885. He graduated at Columbia College and at Hamilton Theological Seminary. He was ordained in 1838, and for several years was pastor of various Baptist churches in Alabama, Mississippi and Texas. Subsequently he became president of the Mississippi Female College, of Semple Broadus College, of Mount Lebanon College, and of Baylor University, which latter position he occupied at the time of his death. Crane College, at Independence, Texas, was named after this eminent divine.

CRANE, WILLIAM H., an American actor; born at Leicester, Massachusetts, in 1845, was a dry-goods clerk in Boston, and, becoming a member of an amateur theatrical company, imbibed a liking for the stage, and made his first appearance in 1863 at Utica, New York, representing the notary in *The Child of the Regiment*. He was a member of the Holman Opera Troupe, and afterward was leading man with Alice Oates. Returning from successful appearances in San Francisco, Chicago and the West, he appeared as Le Blanc, in *Evangeline*, at Niblo's Garden, New York. In 1877 he appeared for the first time with Stuart Robson, in co-partnership, at the Park Theater, New York City, in the farce, *Our Boarding House*. They also, as co-partners, produced *Forbidden Fruit; Our Bachelors; Sharps and Flats; The Comedy of Errors; The Merry Wives of Windsor;* and Bronson Howard's great success, *The Henrietta*. The partnership coming to an end, Mr. Crane starred by himself in *The Senator* (1889); *The American Minister* (1892); and several new plays.

CRANES. Traveling-cranes have come into very common use within the past twenty years, in large

factories and workshops, for moving heavy articles. Usually they are mounted on overhead railways, and driven by individual electric motors. In a large shipyard at Wallsend-on-Tyne, England, a complete structure of traveling-cranes has been built over one of the docks, and what is virtually a new system of ship-building has been introduced. A steel framework 500 feet long, 68 feet wide and 80 feet high is made to bear two longitudinal tracks, 22 feet apart, on which the cranes run, traveling back and forth at a speed of 300 feet a minute. They are all electrically driven, and can be run the length of the framework. The work of building or repairing ships in the dock below is rendered very much simpler with these means of handling the heavy girders, timbers, spars, etc. The cranes each weigh 14 tons, and carry jibs with hoisting-gear so protected by springs that by no accident can a crane be injured by lifting more than it is designed to sustain. Very large cranes for lifting one hundred to two hundred tons often are made with a hydraulic cylinder and piston, in place of tackle, to do the lifting. Of course this involves much greater height, but it saves the friction on the tackle, which is something enormous, where such large weights are handled. One of these hydraulic cranes, erected at Leeds, England, in 1894, lifted 320 tons at a radius of 75 feet. The base of this machine is a large rotating platform, on which is mounted a boiler-house and three steam-engines, which assist in the counterpoising of the jib.

C. H. Cochrane.

CRANESBILL. See Geranium, Vol. X, p. 439.

CRANEY ISLAND, a small island in Norfolk County, southeastern Virginia, W. of the mouth of the Elizabeth River. Government powder-magazines and a lighthouse are located here. Lat. 36° 53′ 28″ N., long. 76° 21′ W.

CRANSTON, Earl, an American clergyman, bishop of the Methodist Episcopal Church; born in Athens, Ohio, June 27, 1840. His education was obtained at the Ohio University, at Athens. He enlisted in the Union army, and rose to the rank of captain in the Sixtieth Ohio Volunteer Infantry. With the advent of Appomattox he exchanged the sword for the Bible, and for some time served pastorates in Ohio. His subsequent charges were at Evansville, Indiana; Jacksonville, Illinois; and Denver, Colorado, where he was presiding elder. In 1884 he was chosen to succeed Bishop Walden as one of the agents of the Western Methodist Book Concern, in Cincinnati. He held this position until May 18, 1896, when he was elected a bishop of the Methodist Church. He took high rank as a pulpit orator.

CRATÆGUS. See Hawthorn, Vol. XI, p. 536.

CRATER LAKE, a body of water occupying the crater of an extinct volcano in the southern Cascade Mountains, in Klamath County, Oregon. It is oval in form, being six miles long and a little less than five wide. Its surface is 6,240 feet above the sea-level, and it is two thousand feet deep. It is surrounded by almost perpendicular cliffs from fifteen hundred to two thousand feet above its surface. It is fed by springs and has no visible outlet.

CRAVEN, Alfred Wingate, an American civil engineer; born at Washington, District of Columbia, Oct. 20, 1810; graduated at Columbia College in 1829. He studied law, but preferred civil-engineering, and soon was busy in the successful prosecution of his adopted profession. It was under his supervision that the reservoir in Central Park, New York City, was constructed, as well as the other works connected with the establishment of a thorough water system for the city during the years from 1849 to 1868. He was instrumental, also, in securing the enactment of proper measures for the establishment of proper sewerage-works for New York. He was associated in the construction of the underground railway along Fourth Avenue to the Harlem River. He was president of the American Society of Civil Engineers from 1869 to 1870, being one of its original founders. He died in Chiswick, near London, March 29, 1879.

CRAVEN, Thomas Tingey, an American naval officer; born in Washington, District of Columbia, Dec. 30, 1808, brother of the above; entered the navy in 1822; became sailing-master of the *Erie* in 1828; commissioned lieutenant in 1830, and in 1838 commanded the *Vincennes*. He subsequently served on the *Boxer*, *Fulton*, *Monroe*, *Macedonia*, *Porpoise*, *Ohio* and *Independence*, and commanded the *Congress*, *Brooklyn* and *Niagara*. In June, 1861, he was assigned to the command of the Potomac flotilla, and while in command of the *Brooklyn* took a prominent part in the capture of New Orleans. He was commissioned as rear-admiral in 1866, and placed in command of the navy-yard at Mare Island, California. He was retired in 1869, and died in Boston, Massachusetts, Aug. 23, 1887.

CRAVEN, Tunis Augustus Macdonough, a distinguished American naval officer, brother of the two preceding; born at Portsmouth, New Hampshire, in 1813. He entered the United States navy in 1822, and served in different vessels and in various capacities until 1857, when he commanded the Atrato expedition for the purpose of surveying the Isthmus of Darien. Subsequently he was engaged as commander of the *Mohawk* in the suppression of the slave trade. He was very efficient in rendering assistance to merchant vessels, and for his service in this direction the New York Board of Underwriters presented his wife with a silver service of plate, while the queen of Spain presented him with a gold medal. In 1861 he commanded the *Tuscarora* while engaged in the search for Confederate cruisers. Subsequently he was given command of the monitor *Tecumseh*, and was attached to Admiral Farragut's squadron in the attack on Mobile. In the battle which followed, his vessel was accorded the post of honor. While attempting to attack the Confederate ram *Tennessee*, the *Tecumseh* was destroyed by a torpedo, and sank with nearly all on board. The general orders directed the commanders of the different vessels to pass to the eastward of a certain buoy, in order to avoid the torpedoes, but Commander Craven, in his eagerness to engage the ram, had ordered the monitor to pass to the westward of the buoy. It is related of the brave commander that, while the vessel was sinking, he and his pilot, John Collins, met at the foot of the ladder leading

to the top of the turret. Craven, knowing it was by his own command that the fatal change in the vessel's course had been made, stepped back, saying, "After you, pilot." As a result, the pilot escaped and the commander went down with the ship, Aug. 5, 1864.

CRAWFISH OR CRAYFISH. See CRUSTACEA, Vol. VI, pp. 643, 644, 658.

CRAWFORD, FRANCIS MARION, an American writer, the son of Thomas Crawford, the sculptor, was born at Bagni di Lucca, Italy, Aug. 2, 1854. He was educated partly in America (Concord, New Hampshire), partly in Italy, and partly in England (1870–74), where he had a private tutor and was a member of Trinity College, Cambridge. From 1874 to 1876 he studied at Karlsruhe, and for a short time at Heidelberg. He passed 1876–78 at the University of Rome, studying Sanskrit. In 1879 he went to India, and was editor of a daily paper, the *Indian Herald*, published at Allahabad. He returned to America in 1881, remaining until 1883, when he went to Italy, where (with the exception of a visit to Turkey in 1884) he made his home, near Sorrento. Mr. Crawford's writings have been chiefly in the line of fiction, though he has done some work in critical philosophy and philology. Mr. Crawford's works include *Mr. Isaacs* (1882); *Dr. Claudius* (1883); *To Leeward* (1884); *A Roman Singer* (1884); *An American Politician* (1885); *Zoroaster* (1885); *Tale of a Lonely Parish* (1886); *Marzio's Crucifix* (1887); *Saracinesca* (1887); *Paul Patoff* (1887); *With the Immortals* (1888); *Greifenstein* (1889); *Sant' Ilario* (1889); *A Cigarette-Maker's Romance* (1890); *Khaled* (1891); *The Three Fates* (1892); *Don Orsino*, a sequel to *Saracinesca* (1893); *Pietro Ghisleri* (1893); *Children of the King* (1893); *The Witch of Prague* (1893); *Katherine Lauderdale* (1894); *Marion Darche* (1894); *Upper Berth* (1894); *The Ralstons* (1895); *Love in Idleness* (1895); *Adam Johnstone's Son* (1896); *Casa Braccio* (1896); *Ave Roma Immortalis* (1898); and *Corleone* (1898). It is remarkable that so prolific a writer should present to his admirers a class of fiction of sustained and uniform interest. It is nevertheless true that in his writings, covering a wide field of personal experience as well as fiction, a dull chapter is seldom discoverable. The reason for this general excellence is to be found in the author's surprising versatility, his robust, manly style, and his mastery of striking situations in the delineation of human passion. His works, at their best, are strongly dramatic, as well as finely imaginative.

F. MARION CRAWFORD.

CRAWFORD, SAMUEL WYLIE, an American soldier; born in Franklin County, Pennsylvania, Nov. 8, 1829; graduated at the University of Pennsylvania in 1847, and became an assistant surgeon in the United States army in 1851. In 1860 he was stationed at Fort Sumter, and had command of a battery during the bombardment of that fort at the outbreak of the Civil War. In 1862 he vacated his commission as assistant surgeon, and accepted the appointment of major in the Thirteenth New York Infantry. Shortly afterward he was commissioned brigadier-general of volunteers, and brevetted from colonel in 1863 to major-general in 1865. He rendered efficient service in the Shenandoah campaign, and was conspicuous for his bravery in the battles of the Wilderness, Winchester, Cedar Mountain, Spottsylvania, Petersburg, Five Forks and other engagements. In 1873 he was retired with the rank of brigadier-general, and died at Philadelphia, Nov. 3, 1892.

CRAWFORD, WILLIAM HARRIS, an American lawyer and statesman; born in Nelson County, Virginia, Feb. 24, 1772; died in Elberton, Georgia, Sept. 15, 1834. In 1800 he was appointed with Horatio Marbury to revise the laws of Georgia, and was elected to the legislature in 1802, and in 1806 to the United States Senate, and during the canvass fought two duels, in one of which he killed his opponent. He was an ardent Republican and a stanch friend of Jefferson. In 1813 he declined the office of Secretary of War in President Madison's cabinet, and was appointed minister to France, where he became an intimate friend of the Marquis de Lafayette, who appointed him agent of his property in the United States. He returned to the United States in 1815, and was made Secretary of the Treasury, serving through both terms of Monroe's administration, after which his name was presented for the office of President of the United States. He was opposed by Calhoun, and in the ensuing campaign, in which General Jackson, Henry Clay, John Quincy Adams and Crawford were candidates, he received the votes of four states. Returning to Georgia, he lived in retirement until he was made judge of the northern circuit of Georgia in 1827, which office he held until the time of his death.

CRAWFORDSVILLE, a thriving city and the capital of Montgomery County, western central Indiana, 43 miles W.N.W. of Indianapolis, on the Cleveland, Cincinnati, Chicago and St. Louis, the Louisville, New Albany and Chicago and the Terre Haute and Indianapolis railroads. Among its chief industries are the manufacture of buggies, of hubs and spokes, coffins, and elevators. It has also foundries and flour-mills. Pop. 1890, 6,089; 1897, 7,075.

CREAMERIES. See BUTTER, *ante*, pp. 638–40.

CREASY, SIR EDWARD SHEPHERD, English historian; born at Bexley, Kent, Sept. 12, 1812. He studied at Eton and King's College, Cambridge, and in 1834 was elected a fellow. Called to the bar in 1837, he practiced on the home circuit for more than twenty years, was for several years assistant judge at the Westminster sessions court; and in 1860–73 was chief justice of Ceylon, and was knighted in 1860. He wrote *The Fifteen Decisive Battles of the World* (1851); *Invasions of England* (1852); *History of the Ottoman Turks* (1854–56); *History of England* (2 vols., 1869–70); etc. Died at Hampton Wick, Jan. 27, 1878.

CREATINE ($C^4H^9N^3O^2+H^2O$). This body was discovered by Chevreul in meat-broth. It exists ready-formed in the muscles, and passes into the extract of meat. It may be prepared by treating

the solution of this extract with basic acetate of lead, filtering, freeing the filtrate from excess of lead by hydrogen sulphide, and evaporating the solution at a gentle heat until it crystallizes. The crystals are separated from the mother liquor, and alcohol added to the latter precipitates a fresh quantity of creatine.

CREDENCE, in the Roman Catholic and Anglican churches, a small table beside the altar or communion-table, on which the bread and wine are laid before being consecrated. Sometimes the place of the credence is supplied by a niche in the sanctuary wall. The term was used also for a sideboard on which the food was placed to be tasted before serving, as a precaution against poison. Hence the origin of the word.

CRÉDIT MOBILIER SCANDAL, the name applied to a scandal in the United States in the year 1872, investigated by a Congressional inquiry, which developed a huge attempt at bribery and corruption. When the Union Pacific railroad was being constructed, it was found, in 1866, impossible to secure the requisite capital to complete the road. Oakes Ames, a wealthy Congressman from Massachusetts, finally was induced to undertake the work. Finding in Philadelphia a "Pennsylvania Fiscal Company," under whose charter the work might be prosecuted and the liabilities of the contracting parties limited, he purchased the charter and changed the name to the Crédit Mobilier of America. Under this name the construction company completed the road, some seven hundred miles, for the Union Pacific Railroad Company. To aid the company, Congressional grants and concessions were secured. When, however, in 1871, one of the stockholders of the Crédit Mobilier brought suit to compel the delivery of certain shares he alleged had been promised him, the trial developed the fact that Mr. Ames had a list containing the initials of many members of Congress, and that he had written a letter, stating that he had placed certain shares "where they would do the most good." The excitement aroused was intense, and led at once to an investigation by the House of Representatives. Mr. Ames vigorously defended himself, denying any breach of integrity, declaring that he had risked his fortune to accomplish what no one else would have done and to do a work of incalculable benefit to the government. In the course of debate it was charged that several leading advocates of the plan had been bribed by donations of large blocks of shares in return for their influence, among the culprits being Schuyler Colfax, the Vice-President of the United States and several Senators and Congressmen. As a result, resolutions of censure were passed in Congress against Ames and James Brooks of New York. Mr. Ames died soon after. Subsequent inquiry quite generally cleared his reputation of all charge of fraud. The scandal, after a time, died away.

CREEDE, one of the phenomenal mining towns of Colorado, the capital of Mineral County, in the southwestern portion of the state. It lies on the southerly slope of a spur of the San Juan Mountains, and its existence as a town dates from 1891, when the influx of miners began. The first mine (a silver mine) was located in 1889 by N. C. Creede. In 1893 the place had a population of 5,000, and during that year nearly the entire town was obliterated by fire, the loss aggregating $1,000,000. It was rapidly rebuilt, and notwithstanding the general depression in the silver-mining industry, is one of the most prosperous of the "silver" camps of Colorado. The place is upon a branch of the Denver and Rio Grande railroad, is lighted by electricity, and has many of the adjuncts of latter-day civilization. Besides mining, it has a considerable lumber-manufacturing industry. Population, about 5,000.

CREEDMOOR, a village of Long Island, 12 miles E. of New York City by rail, with an extensive rifle-range, established in 1871, the cost being defrayed jointly by the state and the cities of New York and Brooklyn. It is the property of the state.

CREEPER, a small group of birds of the family *Certhiadæ*, so named because of their habit of rambling about trees in search of food. They are common in Europe and America.

CREEPING OF RAILS, a movement of the rails of a railway track in the direction of heaviest traffic, which takes place most observably where the rails pass over an elastic bed, a grade or a bridge. The Canadian Pacific railway, in its western division, passes over a regular bog, which yields, it is calculated, about six inches under the pressure of an ordinary train. The rails thus become a succession of waves. The rails move about twelve inches in the course of a mile and a quarter, and the distance is greater, the longer and heavier the train. The phenomenon is easily observed and studied on the eastern approach to the St. Louis bridge and on the bridge itself. Over these points, about four thousand one hundred feet, the amount of "creep" has been observed to be nearly a foot a day. Provision had to be made for keeping the rails continuous, by employing men to put short pieces of rails at one end and taking them out at the other. Nothing could prevent this motion; spikes, bolts or joints would either be broken or the rails twisted out of shape. Professor Johnson of the Washington University, St. Louis, gave the subject close study, and in 1885 explained the phenomenon by attributing it to the wave-motion induced in the rail by the pressure of the train and the consequent elongation of the lower flange of the rail; while the rear ends of the lines of rails are held down by the weight of the train, the front ends move forward in consequence of the elongation experienced; and the train, moving forward, holds the elongated rail in its new position, the rail being thus prevented from resuming its former position. The remedy suggested was to support the rail under the upper instead of under the lower flange. When this can be effected, the direction of the motion will be actually reversed.

CREEPS, a miner's term for the depression which takes place on the surface from the removal of beds of coal beneath. Masses of the coal-seam, like huge pillars, are left by the miners for the support of the superincumbent strata.

CREIGHTON, MANDELL, an English historian; born at Carlisle in 1843; graduated at Merton College, Oxford, with high honors in 1867; ordained in

1870, and became honorary canon of Newcastle in 1882. In 1884 he was elected professor of ecclesiastical history in Cambridge University, and next year became canon residentiary of Worcester Cathedral. He edited the *English Historical Review* from 1886, and received the degree of LL.D. from Harvard. He was the author of a useful series of historical manuals, etc., including *History of Rome* (1875); *The Age of Elizabeth* (1876); *The Tudors and the Reformation* (1876); *A History of the Papacy During the Reformation* (1882); and *Cardinal Wolsey* (1888).

CREMATION, the burning of the dead as a substitute for their burial. There has been a steady increase of interest in cremation in the United States since the first regular crematory went into operation in 1885. The United States Cremation Company of New York was among the first in the field. Its cinerator was designed by C. J. Eames and Dr. M. L. Davis. The retort for corpses is built of fire-brick. The body is placed in a chamber immediately over the fuel-chamber, which is heated through holes. The draft is so arranged, however, that no flames reach the body. The volatile matter runs out through highly heated chambers, and is dissipated in the atmosphere. The fuel used is coal. A temperature of 2000° to 2500° F. is maintained, and about two hours are required for the cremation of a corpse.

Dr. Davis has designed the cinerators for several other crematories, and has improved the original design. That at Lancaster, Pennsylvania, has double retorts and furnaces. The materials used are fire-brick, tiles of fire-clay, asbestos, sand and iron. The retorts are so set in the center of each furnace that the flames are made to pass around them three times. The doors are all packed air-tight with asbestos. The volatile matter from the bodies is carried off through flues, in which a temperature of 2500° F. is maintained. Forty-five to ninety minutes are required for the incineration of a body.

In Allegheny County, Pennsylvania, there has been constructed a combined crematory and columbarium, with one hundred niches for urns, to contain the ashes of the dead. The building is very tastefully and expensively designed and decorated. At the Pittsburg crematory the Davis cinerator is used, with natural gas as fuel. Its incinerating capacity is one hour to an hour and a quarter. The Buffalo, New York, crematory makes use of an Italian form of cinerator, designed by Engineer Joseph Venino, being the same used at Milan, Padua and Udine, in Italy, and in Troy, New York. Other United States crematories are located at Detroit, San Francisco, Philadelphia, Waterville (New York), etc., to the number of about twenty. See CREMATION, Vol. VI, p. 565. C. H. COCHRANE.

CRÉMIEUX, ISAAC ADOLPHE, a French statesman; born at Nîmes, France, in 1796; became a lawyer in Paris in 1830. In 1842 he entered the Chamber of Deputies and voted with the Extreme Left. He became Minister of Justice in the provisional government in February, 1848, but retired in June. During the empire he held no public office, but when the republic was proclaimed he became again Minister of Justice, and was associated with Gambetta in the Ministry of the National Defense. He was elected life Senator, Dec. 15, 1875, and died Feb. 10, 1880.

CRERAR, JOHN, a Chicago business man and philanthropist; born in New York City in 1827; died Oct. 19, 1889, and left $3,000,000 for charitable purposes, of which $2,000,000 was set apart for the founding of a free public library to bear his name. In 1895, after a long contest of the will had been defeated, the trustees of the library decided to devote it exclusively to works on the sciences.

CRESAP, MICHAEL, an Indian trader; born in Maryland in 1742. In 1774, at Wheeling, he led an attack on the Indians, who had become unruly, and defeated them, while another party barbarously destroyed the entire family of Logan, a friendly chieftain. Logan accused Cresap of the murder, in a speech that has become classic, but Cresap was not guilty. Commissioned captain of the militia of Virginia, he joined the Dunmore expedition, and returned to Maryland; from there he went to Ohio in the spring following, and penetrated the wilds of far western Virginia. Later he was commissioned captain of a company of Maryland riflemen, and went with his company to Massachusetts to join the American army. But when he arrived at his destination he was overcome by sickness, and died on his way homeward, in New York City, in 1775. His remains lie buried there, in Trinity churchyard, and a tombstone marks his grave.

CRESCENT, a decoration, sometimes called an order, in Turkey. According to ancient legend, when Philip of Macedon was besieging Byzantium, he began secretly to undermine the walls. But the light of a crescent moon discovered his design. The Byzantines, in gratitude, adopted the crescent as the emblem of state. In 1259, Sultan Othman, the founder of the Ottoman dynasty, adopted the crescent as his symbol, on account of a remarkable vision or dream. It has been the emblem of the sultanate ever since. In 1799, after the battle of Aboukir, the sultan, Selim III, testified his gratitude to Nelson by sending him a crescent richly adorned with diamonds. It was not intended as an order, but Nelson wore it on his coat; and Selim, flattered by the value attached to his gift, resolved that a similar decoration should be conferred on foreigners who had done service to the state. There was an old order of the Crescent instituted by Réné, Duke of Anjou, in 1464.

CRESCENT CITY, a city and county capital, on the southern side of Point St. George, in Del Norte County, northwestern California. Lumber is its greatest export. A lighthouse stands on this point, lat. 41° 44′ 34″ N., long. 124° 11′ 22″ W. Population 1890, 907.

CRESCENTINO, a town of north Italy, in the province of Novara, 22 miles N.E. of Turin, situated near the confluence of the Dora Baltea with the Po. It has manufactories of silk and woolens. Population, 6,300.

CRESCO, a railroad village, the capital of Howard County, northeastern Iowa, on the Chicago, Milwaukee and St. Paul railroad, and on the Turkey

River, 40 miles N.E. of Charles City. It is a great shipping-point for wheat, and has foundries and other manufactories; also, a good union school and a Catholic parochial school. Population 1895, 2,529.

CRESOLS (C^7H^8O), a product of coal-tar distillation. There are three cresols, two solid and one liquid. They may be formed by treating toluene with sulphuric acid. The liquid cresol was discovered by Fairlie, and extracted from wood-tar by Duclos. It is a colorless liquid, with an odor like that of phenol, and boils at 189–190°. See also TAR, Vol. XXIII, p. 57.

CRESSES, a popular name given to a number of low, usually annual, plants, mostly members of the mustard family (*Cruciferæ*), common throughout the temperate zones, and characterized by the pungent taste of their stems and leaves, which, when young, are valued for salads. They are also used for certain medicinal purposes, chiefly as a diaphoretic. The English water-cress (*Nasturtium officinale*) and the American water-cress (*Cardamine rotundifolia*) are those best known and of chief economic importance. *Lepidium sativum*, the common garden cress, a native of Russia, has been widely introduced in the United States. It is used in the preparation of a remedy efficient in the prevention of scurvy. See also *Cress* and *Nasturtium* under HORTICULTURE, Vol. XII, pp. 281 and 285.

CRESSON, a post village and summer resort of Cambria County, southwestern central Pennsylvania, situated on the top of the Alleghany Mountains, three hundred feet above the sea. It is 11 miles by rail E. of Ebensburg, and its fine scenery, pure air and the reputation of its magnesia springs attract many visitors.

CRESTLINE, a city in Crawford County, northern central Ohio, 12 miles N.E. of Bucyrus, on the Pittsburg, Fort Wayne and Chicago railroad. The Pennsylvania railroad has repair-shops here; and among its industries are lock-works, furnace and stove factory, foundries, etc. Population 1890, 2,911.

CRESTON, a city of southern Iowa, about two hundred miles W. of Burlington, on the Chicago, Burlington and Quincy railroad. It is an important trade center, and is the northern terminus of a railroad extending to St. Joseph, Missouri. It contains a variety of manufactories, including large wagon factories and car-shops. Population 1895, 6,630.

CRESWELL, JOHN ANGELL JAMES, American statesman; born in Port Deposit, Md., Nov. 18, 1828. He graduated from Dickinson College, Carlisle, Pennsylvania, and was admitted to the bar in 1850; a member of the state legislature from 1860 to 1862, of Congress in 1863, and in the United States Senate in 1865. In 1869 President Grant made him Postmaster-General, which position he held till 1874. Mr. Creswell represented the United States before the Court of Commissioners of Alabama Claims. He died at Elkton, Maryland, Dec. 23, 1891.

CRETACEOUS PERIOD. See GEOLOGY, Vol. X, p. 357.

CRETE, a manufacturing city and railroad junction of Saline County, southeastern Nebraska, 21 miles S.W. of Lincoln, on the Big Blue River, and on the Burlington and Missouri River railroad. It is the seat of a theological seminary and Doane (Congregational) College. Population 1890, 2,310; of the precinct, 3,283.

CRÉTIN, JOSEPH, a Roman Catholic bishop; born in Lyons, France, in 1800; died in St. Paul, Minnesota, Feb. 27, 1857. He studied in his native diocese, and in 1839 was appointed vicar-general Dubuque, Iowa. From 1843 to 1849 he was at Prairie du Chien, among the Winnebagos, when he was appointed to the new see at St. Paul, Minnesota, where, later, he erected a hospital, an asylum and novitiate. Subsequently he established churches among several tribes of Indians, and erected a convent of the Benedictine order at St. Cloud, which has since grown into a great school and abbey. When he was appointed to Minnesota, there were in his diocese one log church and three priests. A few years later there were 29 churches and 20 priests, with a Catholic population of more than fifty thousand.

CRÉTINEAU–JOLY, JAQUES, a French historian; born at Fontenay-Vendée, Sept. 23, 1803. He studied theology in Paris, and became a supporter and defender of royalty and the church. He wrote a *History of the Jesuits*, in six volumes, which is his best-known work (4th ed. 1856). His other publications include *Histoire de la Vendée Militaire* (1864); *Histoire de Louis Philippe* (1867); and *Le Pope Clement XIV* (1853). He died at Vincennes, Jan. 1, 1875.

CRETINISM. See Vol. VI, pp. 572–574; and PHYSIOLOGICAL CHEMISTRY, in these Supplements.

CREVAUX, JULES NICHOLAS, a French explorer; born in Lorquin, Lorraine, April 1, 1847. He became assistant surgeon in the French navy in 1868, and surgeon five years later; was awarded the cross of the Legion of Honor in 1876 for his devotion to the fever patients on the Salut Islands. Subsequently he explored the Tumuc-Humac Mountains, and descended the Yaru to the Amazon. He afterward explored the Yapoura, the Pilaya and the Pilcomayo rivers. On April 24, 1882, while prosecuting his explorations in the region of the Teyo, he was murdered by the Tapeti Indians.

CRÈVECŒUR, the name of a Dutch port in the province of North Brabant, southern Holland, on the left bank of the Meuse, 49 miles S.E. of the Hague. It figured prominently in the wars of the Dutch and Spaniards. Population, 2,129.

CREVILLENTE, a town of southeastern Spain, in the province of Alicante, 21 miles S.W. of Alicante. It has a population of about 16,114, chiefly engaged in agricultural pursuits and weaving.

CREWKERNE, a town in the southeast of Somersetshire, southern England, 15 miles S.E. of Taunton. It lies in a wooded, fertile vale, not far from the river Parret, has a fine church, and a grammar school founded by John de Coombe in 1449, and some manufactures of sailcloth, sacking, dowlas and stockings. Population, 4,946.

CRICHTON–BROWNE, SIR JAMES, an English physician, son of Dr. W. A. F. Browne, her Majesty's commissioner in lunacy for Scotland; born at Edinburgh in 1840; was educated at Trinity College, Glenalmond, Perthshire, at the University of Edin-

burgh, and at the medical schools of London and Paris. He was president of the Medico-Psychological Association, of the Neurological Society of London, and of the Royal Medical Society of Edinburgh; vice-president and treasurer of the Royal Institution of Great Britain, a fellow of the Royal Society, and lecturer in many north of England hospitals and asylums. As head of the West Riding Asylum in Yorkshire, he raised the institution to the highest state of efficiency and made it famous as a great medical school and place of original research, it being here that Professor David Ferrier made his discoveries as to the functions of the brain. He took great interest in the education of children, and has been instrumental in introducing many reforms of a beneficial nature. He received his knighthood in 1886.

CRILLON, LOUIS DES BALBES DE BERTON DE, a French knight, surnamed "Le Brave"; born at Murs, in Provence, in 1541. He distinguished himself in battles at Calais, Guines, Dreux, Jarnac and Moncontour, receiving numerous church benefices as a reward for his heroism. After the battle of Ivry in 1590, he retired from public life, spending his last days in works of piety and penance. Died at Avignon in 1615.

CRIMEAN WAR. See ENGLAND, Vol. VIII, p. 366; and FRANCE, Vol. IX, pp. 623, 624.

CRIME OF 1873, THE. A phrase first used by a Western Senator, and subsequently popular with the advocates of free and unlimited coinage of silver in the Presidential campaign of 1896, wherewith to describe the alleged surreptitious passage of an act of Congress at this date. Considerable interest centers in this enactment, not only because the Free Silver party regard it as a great crime to "demonetize" silver, but because its more fervid advocates have claimed that the statute went through the halls of Congress "like the silent tread of a cat." The first requisite of a proper understanding of the subject is a consideration of the statute itself. No codification of the mint laws had been made since 1837, and a complete revision of all technical matters of assaying and coinage was commenced in 1870. The Treasury authorities were desirous of obtaining as nearly a perfect system as possible, and with this object in view, sent out the new provisions to scores of experts for suggestions and criticism. Many and varied were the replies. They can be found printed in the House of Representatives Executive Document, No. 307, Second Session, XLIst Congress. In this draft-bill for criticism, a silver dollar of 384 grains standard weight (i.e., 345.6 grains pure silver) was proposed as one just equal to the dollar's value of subsidiary coins issued since 1853. The intention of the bill to cease coining the old silver dollar piece was open and clear. The bill was submitted to Congress by the Secretary of the Treasury, April 25, 1870, and, after having been printed thirteen times, became a law, Feb. 12, 1873. The discussions of its provisions in Congress fill 144 columns of the *Congressional Globe*. The statute as finally passed is as follows, so far as it is of interest and affects the question of the demonetization of silver:

Sec. 14. That the gold coins of the United States shall be a one-dollar piece, which, at the standard weight of 25.8 grains, shall be the unit of value. [Then follow directions as to the other gold coins.]

Sec. 15. That the silver coins of the United States shall be a trade dollar, a half-dollar or fifty-cent piece, a quarter-dollar or twenty-five-cent piece, a dime or ten-cent piece; and the weight of the trade dollar shall be 420 grains troy, the weight of the half-dollar shall be twelve grams and one half of a gram; the quarter-dollar and the dime shall be, respectively, one half and one fifth of the weight of said half-dollar; and said coins shall be a legal tender at their nominal value for any amount not exceeding five dollars in any one payment,

Sec. 17. That no coins, either of gold, silver or minor coinage, shall hereafter be issued from the mint other than those of the denominations, standards and weights herein set forth.

This is the whole of the act of 1873 which deals with the "demonetization" of silver. In the discussions in Congress no opposition was manifested to the omission of the 412½-grain silver dollar, because it was alleged to have been out of circulation since 1840. The omission attracted no attention, for the reason that no such coins were in use.

The procedure as to the act of 1873, when tabulated, reads as follows:

PROCEDURE.	SENATE.	HOUSE.
Submitted by Secretary of the Treasury	April 25, 1870	
Referred to Senate Finance Committee	April 28, 1870	
Five hundred copies printed	May 2, 1870	
Submitted to House		June 25, 1870
Reported, amended and ordered printed	Dec. 19, 1870	
Debated	Jan. 9, 1871	
Passed by vote of 36 to 14	Jan. 10, 1871	
Senate bill ordered printed		Jan. 13, 1871
Bill reported with substitute and recommitted		Feb. 25, 1871
Original bill reintroduced and printed		Mar. 9, 1871
Reported and debated		Jan. 9, 1872
Recommitted		Jan. 10, 1872
Reported back, amended and printed.		Feb. 13, 1872
Debated		April 9, 1872
Amended and passed by vote of 110 to 13		May 27, 1872
Printed in Senate	May 29, 1872	
Reported, amended and printed.	Dec. 16, 1872	
Reported, amended and printed.	Jan. 7, 1873	
Passed Senate	Jan. 17, 1873	
Printed with amendments; conference committee appointed		Jan. 21, 1872
Became a law, Feb. 12, 1873		

The literature on the subject has been learned, fervid and voluminous. Senator John Sherman's *Recollections;* Prof. J. L. Laughlin's *Facts About Money;* J. K. Upton's *Coin Catechism;* and J. F. Cargill's *Freak in Finance*, may be relied on for the sound-money side of the argument. The free-silver argument can be found in Coin's *Financial School* and several similar works.

CRIMES ACT, IRELAND. See HOME RULE, in these Supplements.

CRIMINALITY, or the state or quality of being

criminal, in its bearings on social questions and the eventual improvement or advancement of the race, is now one of the most serious considerations of thinkers and those who are necessarily engaged in the study of the criminal classes from a detective, preventive or scientific standpoint. The study of crime has indeed been advanced to the dignity of a science called criminology. Criminologists are inclined to believe that a criminal is a hereditary resultant; hence such an individual may be styled criminaloid, or with a criminal taint. Dr. S. A. K. Strahan holds that the criminal belongs actually to a decaying race, being in fact only one of the many signs of family decay, and is only found in families whose other members show signs of degeneration. Besides being hereditary, he thinks criminality is interchangeable with other degenerate conditions, such as idiocy, epilepsy, suicide, insanity, scrofula, etc.; and it is not certain, or it is a "chance," whether the insanity or drunkenness, for instance, of the parent will appear as such in the child or be transferred in transmission to one or other of the alternate degenerate conditions. As to the treatment of the criminal, or criminaloid, for the purpose of effectually eradicating the stock from the human element, no system has been, or can be yet, heroically adopted. The time is not ready for the evident measures necessary. Herbert Spencer has declared that not only have artificial punishments failed to produce reformation, but they have in many cases increased criminality. Ruskin has said that reformation depends on the establishment of institutions for the active employment of the individuals while their criminality is still unripe. The present system, Dr. Strahan declares, has proved a disastrous failure. Short periods of punishment can have no effect, either curative or deterrent. Everything points in the direction of prolonged or indefinite confinement in industrial penitentiaries. It is certainly upon such lines that the treatment of the criminal will eventually have to proceed; but the question arises, if the criminaloid is a hereditary resultant, he cannot be regarded as responsible; therefore his treatment should not be conducted upon the idea of inflicting punishment, but on the principle of isolation and the securing the prevention, through him, of the further transmission and continuity of the taint that has developed in his hereditary line. The taint must be drained out of the stream of continuity—of hereditary forces—by simply securing, in such individual, an obliteration of such lineal tendency.

CRIMINALS, IDENTIFICATION OF. While various systems have been in use from time immemorial, for the identification of persons charged with crime, it remained for Alphonse Bertillon of Paris to perfect, in 1882, a system that was adopted by the French government, affording a positive means of immediately recognizing and identifying a person who had ever, at any time, been examined according to the rules laid down in the code established by him. The measurements as established are applicable to individuals, tribes or races. The list embraces height; length and width of head; length of left middle and little fingers, forearm and foot, full stretch of arms; and length and breadth of right ear. All marks and scars are fully described and recorded, and exact position noted; all peculiarities of the eyes and hair are given. In defining a scar, its precise location is noted as being either on the right or left of the vertebral column, as well as above or below the plane of the seventh vertebra. For scars on the face the localities and measurements are reckoned from the nostrils, the bridge of the nose, the corners of the mouth, chin, cheek, eyebrows; on the breast, the median line, the nipples, the sternum, are taken as bases; for the arm, the measurements are reckoned from the shoulder, elbow, wrist; for the fingers, the phalanges and articulations. It was found that in the measurements of 130,000 individuals by the police in Paris, no two cases were alike, and it was very seldom that the same kind of scar or mark was on two different persons in the same position. In the practical working of the system, three divisions are made: tall, medium and short. This is designated as the first classification. Each of these classes is further subdivided under head-measurement, followed in turn by other classifications and divisions until the whole number is divided into groups of about ten persons each. As an example of the speed and accuracy with which a criminal can be identified when he refuses to give his name, it is necessary to take, first, his height, thereby locating him in one of the grand divisions, tall, medium, or short, and thereby locating the series of compartments or drawers where his recorded measurement and photograph are to be found. The measurement of the length of the head brings still nearer; the color of the eyes, the length of the outstretched arms, and the length of the foot will bring the searcher to the exact spot where the full description and pictures identify the culprit beyond a doubt. Two photographs are usually taken, one with a profile view, the second a three-quarter face.

The plan adopted by the police of the United States is regarded as an improvement and simplification of the methods as given in the foregoing description. The method in vogue for many years has been to take the height and weight; note the complexion; the color and any other peculiarity of the hair; the teeth, eyes, nose, etc. In the matter of the nose, care is taken to describe it as either regular, irregular, Roman, pug or Grecian. All scars are located and described; birth-marks and India-ink marks, with all deformities, and evidences of accidents are recorded. The measurements can be taken by one policeman, but for rapid work two are usually required,—one for the measuring and one for the recording. The instruments used are calipers, compasses and graduated rules, which, although inexpensive, are so exact that the diameters of the head and the length of the fingers can be given to within one millimeter. The entire system of measurement has recently been exhaustively treated in Alphonse Bertillon's *Signaletic Instructions* (1896), edited by Maj. R. W. McClaughry, the well-known penologist.

CRINOIDEA. See ECHINODERMATA, Vol. VII, p. 635.

CRIPPLE CREEK, perhaps the most remark-

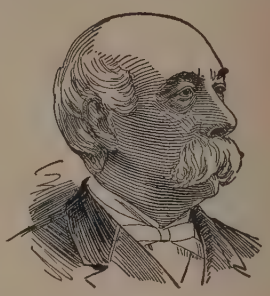
able of all the recent mining towns of the West, is situated on the southwesterly slope of the foothills of Pike's Peak, in El Paso County, and about 30 miles W.S.W. from Colorado Springs. It has two railroads, the Midland Terminal and the Florence and Cripple Creek. Gold was first discovered here about 1885 or 1886; but although the first "prospects" were located upon ground which has since been demonstrated to be of vast richness, they were not, at that time, prosecuted far enough to demonstrate their worth. The first large strike occurred in 1891, and in 1896 a very large surrounding area of territory has been turned into the production of gold upon a profitable scale. Cripple Creek has been to gold-production what Leadville was to the silver-mining industry. They both marked new departures, or virtually new eras, in the mining of the respective metals, inasmuch as they demonstrated that metals lay hidden in and richly impregnated hitherto unsuspected rock-formations; those at Leadville being the lead carbonates, while at Cripple Creek the gold was found in conjunction with dikes ascending through fissures in the earlier volcanic formation. Cripple Creek has had its vicissitudes. In 1894 the town was the scene of great turmoil and uproar on account of the miners' strike, which paralyzed all industry, caused the destruction of much property and the loss of many lives, and involved the whole state and surrounding country. This trouble being finally settled, the town entered upon a new era of growth. New mines were opened and older ones developed; the influx of population was unprecedented, and, notwithstanding a fire during the early part of 1896, which virtually wiped the town out of existence, it soon had all the adjuncts of modern life and a population variously estimated at from 10,000 to 25,000, and an increasing output of gold. In 1895 the production exceeded $8,000,000.

CRISAFULLI, Henri, a French dramatist; born at Naples in 1827; studied in Paris at the College of Charlemagne and at the Massin Institute. In collaboration with M. Édouard Devicque, he produced a large number of dramas, including *Cæsar Borgia* (1855); *Marie Stuart* (1856); *Les Deux Faubouriens* (1857); *Giroflé Girofla* (1858); and afterward, independently, or with others, *Le Démon du Jeu* (1863); *M. et Mme. Fernel* (1864); *Le Passé de M. Jouanne* (1865); *Les Loups et les Agneaux* (1868); *Les Postillions de Fougerolles* (1873); *L'Idole* (1875); *Lord Harrington* (1879); *Le Bonnet le Coton* (1881); *Une Perle* (1882); etc. With Gustave Aimard he has published *Les Invisibles de Paris*, a series of romances (1867).

Charles F. Crisp.

CRISP, Charles Frederick, an American statesman; born in Sheffield, England, Jan. 29, 1845. His parents were Americans temporarily sojourning in England, and returned to this country in 1846. They settled in Georgia, where the boy received the ordinary common-school education. In 1861 he entered the Confederate service; rose to the rank of lieutenant, and in May, 1864, was captured by the Federal forces. At the close of the war he began the study of law, and was admitted to the bar. In 1872 he was given the position of attorney-general of the southwestern judicial district of Georgia, and served until 1877, when he was appointed judge of the superior court. Later he was elected by the general assembly to the same office, and re-elected in 1880 for a term of four years. In 1882 he became a candidate for Congress and was elected. Dec. 8, 1892, Mr. Crisp was elected Speaker of the Fifty-second Congress, and of the Fifty-third Congress in 1893. He died in Atlanta, Georgia, Oct. 23, 1896.

CRISPI, Francesco, an Italian statesman; born in Sicily, Oct. 4, 1819; took a leading part in the Palermo insurrection of 1848, and, after its failure, went into exile. In 1859–60 he organized another revolution, landed at Palermo with Garibaldi, and fought for the expulsion of the Bourbons and the annexation of Sicily. He became a member of the provisional government. In 1861 he was elected to the first Parliament of united Italy, and in 1876 became president of the Chamber of Deputies. He was for several years Premier of Italy, but resigned early in 1891, resuming the office in 1894. Was succeeded by Marquis di Rudini in March, 1896.



Francesco Crispi.

CRITICISM, Higher, a name given to that criticism of books, and especially of the Bible, which is concerned with their origin, form and value. It is distinguished from the lower criticism, which is concerned with their text.

Traces of the higher criticism of the Bible are found during all the Christian centuries. But systematic work in this field is exclusively modern. It began with Jean Astruc, in his book entitled *Conjectures Concerning the Original Memoirs Used by Moses in Composing the Book of Genesis*, which appeared at Brussels in 1753. This book was intended as a defense of the Pentateuch against Spinoza. Astruc pointed to the fact that the names *Jehovah* and *Elohim* are used in alternate passages in the early chapters of Genesis, and that if the passages containing either of these names be put together, they form a connected narrative. He therefore inferred that Moses made use of two earlier documents, in one of which God was uniformly called Jehovah, and in the other Elohim. The theory of Astruc excited great attention, and Eichhorn, who wrote thirty years later, affirmed that the sections of Genesis in which the names of Jehovah and Elohim, respectively, are used are also characterized by other differences of style. Eichhorn gave to this method of study the name of higher criticism, a designation which it has borne ever since.

The conjectures of Astruc and Eichhorn are

called "the document theory." Still later, De Wette published his "supplement theory"; and still later, Ewald his "crystallization theory." Without defining these later theories, it may be sufficient to say that the general tendency of the critical labors which they represent was to extend the document theory to a larger number of Biblical books, to find a larger number of original documents, and to analyze the early books of the Bible more minutely. In our own times the movement of the higher criticism has reached what is called the "Grafian phase," represented by Graf, by Kuenen, by Wellhausen, and by many others. The results presented by this, the now reigning school of higher critics, are stated thus by Zenas, in his excellent book on the higher criticism:

"The credible recorded history of Israel dates from the days of Samuel. With this prophet begins, also, the crystallization of the religion of Israel into its present form. The process thus begun continues through centuries. The Hexateuch is a composite work, whose origin and history may be traced in four distinct stages: 1. A writer designated as J, Jahvist, or Jehovist, or Judean prophetic historian, composed a history of the people of Israel about 800 B.C. 2. A writer designated as E, Elohist, or Ephraemite prophetic historian, wrote a similar work some fifty years later, or about 750 B.C. These two were used separately for a time, but were fused together into JE by a redactor, at the end of the seventh century. 3. A writer of a different character wrote a book constituting the main portion of our present Deuteronomy during the reign of Josiah, or a short time before 621 B.C. This writer is designated as D. To this work were added an introduction and appendix, and with those accretions it was united with JE by a second redactor, constituting JED. 4. Contemporaneously with Ezekiel the ritual law began to be reduced to writing. It first appeared in three parallel forms. These were codified by Ezra not much earlier or later than 444 B.C., and between that date and 280 B.C. it was joined with JED by a final redactor. This general view, always allowing modifications in final details, has been accepted by a large number of European and American scholars, and may be said to be the dominant view at the present time. In America these views have been accepted by C. H. Toy, C. A. Briggs, H. P. Smith and B. W. Bacon."

Many advocates of this view on the continent of Europe have been aided to accept them by preconceptions against the supernatural in the Bible and in the religious history of the world; but in England and America this has not usually been the case. No objection can be made to the higher criticism as a method of study in any field of literature; but the higher criticism of the Bible is to be judged not only by the method of those who pursue it, but also by the conclusions they reach. The unsettling of early Biblical history is so extensive, and the analysis of the Hexateuch presented to us by the higher critics so minute and teasing, that these results can be accepted only when accompanied by overwhelming proofs. But the arguments submitted to us seem often unreal, and if such arguments were applied to the mixed plays of Shakespeare, they would not lead us to a conviction of the value of the dramatist's works.

The literature of the subject is almost boundless, but a fair and complete discussion will be found in *The Elements of the Higher Criticism*, by A. C. Zenas, New York.

F. JOHNSON.

CRITTENDEN, GEORGE BIBB, an American general; born in Russellville, Kentucky, March 20, 1812. He served in the Texan revolution of 1835 and in the Mexican War, being one of the first to enter the City of Mexico. On the outbreak of the Civil War he resigned his commission as lieutenant-colonel in the United States army, and entered the Confederate service. He was commissioned brigadier-general, and speedily promoted to major-general. An unsuccessful attack by his forces on the Union troops at Fishing Creek led to his severe censure, and soon afterward he resigned his commission. After the war he resided in Frankfort, Kentucky, and was state librarian from 1867 to 1871. He died in Danville, Kentucky, Nov. 27, 1880.

CRITTENDEN, JOHN JORDAN, an American statesman; born near Versailles, Woodford County, Kentucky, Sept. 10, 1787. His father, John Crittenden, a native of Virginia, settled in Kentucky after the Revolutionary War, in which he served as major. The son was graduated at William and Mary College in 1807, practiced law, in 1809 was appointed attorney-general of the territory of Illinois, and in 1811 he was elected to the Kentucky legislature. In 1817 he was elected to the United States Senate, where he obtained a reputation by an appeal in behalf of General Arthur St. Clair's petition for payment of the arrears due him. In 1819 he settled in Frankfort, Kentucky, was a conspicuous member of the Old Court party, and aided in settling the boundary between Kentucky and Tennessee. In 1827 he was made attorney-general of Kentucky, and in 1828 was appointed a judge of the supreme court, but was not confirmed. In 1834 he was made secretary of state for Kentucky, and in 1835 was elected to the United States Senate, where he supported Henry Clay's measures. He was appointed Attorney-General in the Cabinet of President Harrison, whom he had first met during an expedition against Canada in 1813.

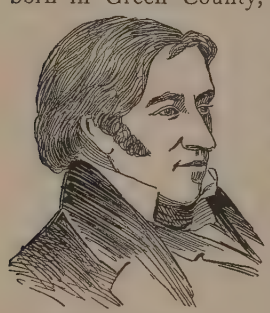
After Henry Clay's resignation in 1842, he was appointed to fill his place, and in the next year was elected for a full term. He resisted the annexation of Texas and supported the war with Mexico. In 1848 he became governor of Kentucky, and in 1850 was made Attorney-General in Fillmore's Cabinet. In 1855 he again served in the United States Senate, and opposed the pro-slavery policy of Pierce and Buchanan. To avert the calamity of secession, Mr. Crittenden presented, in 1860, resolutions proposing constitutional amendments to the states, which were known as the "Crittenden Compromise," but, although supported by numerous petitions, they were not accepted. In 1861 John C. Breckenridge succeeded him in the Senate, but he was elected to the House of Representatives in that year, and

opposed the methods employed in suppressing the Rebellion. He opposed the employment of negroes as soldiers, and objected to the formation of West Virginia. In his last speech in Congress, Feb. 22, 1863, he declared that the government had broken its pledges and diverted the war from its original purpose. He died near Frankfort, Kentucky, July 26, 1863.

CRITTENDEN, THOMAS LEONIDAS, an American soldier; born in Russellville, Ky., May 15, 1815. He studied law with his father, John J. Crittenden, and became commonwealth's attorney for his native state in 1842. He served under General Taylor in the Mexican War, and was consul at Liverpool from 1849 to 1853. On the outbreak of the Civil War he entered the Union army, and in 1862 was promoted major-general and given command of a division of the army of the Tennessee. He subsequently served under Generals Buell and Rosecrans, being in command of one of the two corps that were routed at Chickamauga. He resigned his commission in 1864, but entered the regular army two years later as colonel of the Thirty-second Infantry. For his gallantry at Stone River he was brevetted brigadier-general in 1867. In 1869 he was assigned to the Seventeenth Infantry, and served on the frontier until 1876, when he was transferred to Governor's Island, remaining there until 1881, when he retired. Died in Annandale, Staten Island, N. Y., Oct. 23, 1893.

CROCKETT, a thriving city, the capital of Houston County, central eastern Texas. It is on the International and Great Northern railroad, 38 miles S.E. of Palestine. It has two seminaries. It lies in the center of a fertile agricultural district. Population 1890, 1,445.

CROCKETT, DAVID, an American pioneer; born in Green County, Tennessee, in 1786. He lived with his parents until he was 12 years of age, when he was indentured to a German, with whom he tramped four hundred miles. Disgusted with his occupation, he ran away and returned home, and for several years worked for teamsters and drovers. When 18 years of age he went to school for a few weeks, and learned to read and write. In 1811 he removed to Franklin County, one of the wildest parts of the state, where he engaged principally in hunting, acquiring a reputation as one of the most skillful hunters of his age. In 1813 he served in the war with the Creek Indians, and at its close settled on Shoal Creek, and was appointed a local magistrate by his neighbors. In 1821 he was elected to the state legislature, and, although uneducated and entirely ignorant of the art of public speaking, made a most creditable record. He was returned to the legislature in 1823–24, and in 1826 was elected to Congress. He served two terms, and from 1833 to 1835 served a third term. He was noted in Washington for his thorough independence, shrewdness, strong common sense and humorous eccentricities of manner. After his career in Congress he joined the Texans in their contest for independence, and was one of the 140 defenders of Fort Alamo, in San Antonio de Bexar, being one of the six survivors who surrendered to General Santa Anna, and who were massacred treacherously by his orders, March 6, 1836.



DAVID CROCKETT.

CROCKETT, SAMUEL RUTHERFORD, a Scotch novelist; born at Little Duchrae, in Galloway, in 1859, the son of a crofter. In 1869 his parents removed to Castle Douglas, where the lad had the advantage of a discriminating teacher, who discovered marks of ability in his pupil and encouraged him, so that in 1876 the boy was able to gain a bursary of $100, and proceed to the University of Edinburgh, where he graduated in the arts department four years later. During his college career he did some journalistic work, and later was recommended by Doctor Jowett of Oxford University to a position as traveling tutor. In this capacity he traveled all over Europe, as well as parts of Asia and Africa. This gave him an opportunity rarely experienced by novelists, and he has utilized the scenes and incidents of these travels in his writings. During this period he contributed fugitive pieces of verse to the Scottish journals, which afterward were collected in a volume entitled *Dulce Cor: The Poems of Ford Bereton.* On returning to Scotland, he commenced his theological training at the Free Church New College, Edinburgh, and, on completing his course, went to occupy the Free Church pulpit at Penicuik, in Midlothian. In 1891 he had written his first prose work, *The Stickit Minister*, for the principal character in which he has stated that a cousin was the model. The book appeared in 1893, and ran through six editions in twelve months, and immediately established the author's reputation as a delineator of local character. Following his first success were *The Raiders* (1894); *The Men of the Moss Hags* (1894); *Mad Sir Uchtred* (1894); *The Lilac Sunbonnet* (1894); *Bog, Myrtle, and Peat* (1895); *The Play Actress* (1895); *The Red Axe* (1898); *The Black Douglas* (1898). He has been styled "the Covenanting Novelist," from the subject of his *Men of the Moss Hags.*

CROCODILE-BIRD. See CROCODILE, Vol. VI, p. 593.

CROCUS, a flowering plant. See HORTICULTURE, Vol. XII, p. 255; and SAFFRON, Vol. XXI, p. 145.

CROCUS OF ANTIMONY, a double sulphide of sodium and antimony formed in the manufacture of the metal. Crocus of Mars is the finely divided red oxide of iron.

CROES, JOHN, an American churchman; born at New Brunswick, New Jersey, July 26, 1832. He early evinced a determination to secure a higher education, which he prosecuted again after he had been in the war of the Revolution, in which he served as a color-sergeant and quartermaster. He opened a school in Newark, New Jersey, and studied for the ministry of the Protestant Episcopal Church. He was ordained deacon, and afterward became rector of Swedesboro, New Jersey, finding there his life's work. He opened a classical school in the

nearly defunct Queen's College, in New Brunswick, New Jersey, which developed into Rutgers College. In 1801 he was made rector of New Brunswick, and was elected bishop of New Jersey in 1815. He received the degree of doctor of theology from Columbia College in 1811. He died in New Brunswick, July 30, 1832.

CROFFUT, William Augustus, an American editor and author; born at Redding, Connecticut, Jan. 29, 1835, and in 1861 enlisted as a private in the United States army, attaining the rank of corporal. After the war he resumed the journalistic work in which he had previously been engaged, and which he was able to prosecute at times during his experience in the Civil War. He had editorial charge of journals in the East and West, including some of the leading dailies of New York City, Chicago and Washington, District of Columbia. He traveled extensively in Europe and in Asia, Mexico, Cuba and Yucatan, and wrote syndicate articles and letters of his experiences. From 1888 until 1891 he was executive officer of the United States Geological Survey, and afterward had editorial charge of the bureau. With John M. Morris he published *The Military and Civil History of Connecticut During the War of 1861–65* (1868); and is the author of *A Helping Hand* (1868); *Bourbon Ballads*, a series of political rhymes (1880); *Deseret*, an opera, with music by Dudley Buck, the motive for the work being drawn from life among the Mormons (1881); *A Midsummer Lark*, a humorous account of a tour in Europe (1882); *The Vanderbilts and the Story of Their Fortune* (1886); *Folks Next Door* (1892); and two volumes of *Poems*. He was invited to contribute an original ode on the opening of the Columbian Exposition at Chicago, May 1, 1893.

CROFTERS are small farmers in the Highlands of Scotland. Their grievances can be traced to the poverty of their landlords, and the advantage the latter took of the modern sporting craze, which has drawn rich bankers and others to seek large game-preserves, for which they gave enormous rents. Another cause that operated was the rackrenting of these crofters, which was especially apparent on the Duke of Argyll's estate. Before the game-preserves, deer-forests, salmon-fishing, and grouse-moors became a mine of wealth to the impoverished Highland lairds, the only means of revenue were the rents of the crofters, and these were stretched to the utmost and kept up by every means, even after the depression had fairly set in. The high rents and reduced prices operating in conjunction with the results of the letting of the game to southern millionaires and sheep-farmers, leading to the wholesale eviction of hereditary tenants, brought the discontent and oppression to a crisis, and before the public as a political matter. A royal commission resulted in the passage of the act of 1886 known as the Crofter's Holdings Act.

There are two classes of Highland crofters. The first includes those who occupy arable land in separate tenancy and mountain pasture in joint tenancy; and the second, those who occupy land in separate tenancy only. Some reminiscences of a primitive community seem to have been preserved in their common rights, privileges and obligations. This system is a survival, by a peculiar transference, of a once common system of tenure in Scotland. The greater number of tenants are descendants of subtenants of the original taskmen of such former period, who, with the disappearance of the taskmen, came into direct relations with the lairds. The township crofter has always been regarded as a tenant at will, in the eyes of the law, except in cases of special contract.

The township crofters, however, have not been able to secure total support from their holdings, and are dependent on various outside sources for securing complete means of subsistence. The chief resource of this kind is fishing.

The independent crofters are a laborious class, and have received great sympathy. They have been recruited from the working-classes in the adjoining counties, and from the number of broken townships dispersed by the formation of sheep-farms. They are a more progressive class than the township crofters, rely more upon their own efforts, and are cultivators principally. Their grievances have been remedied by the act of 1886.

The cottars are occupiers of dwellings and of small pieces of ground, which they hold from the farmer, the township, the individual crofter; sometimes they are squatters merely, paying no rent, and acknowledging authority from no one. They eke out their existence by fishing and other means. Their claims are recognized also by the act of 1886.

The whole trouble of the crofters was aired thoroughly in connection with the disturbance in the Lewis Island, in the Hebrides, which, during the latter part of 1887, was the scene of a deer-raid, forcible seizure of lands, and collisions with military and police authorities. One half of the island had been leased to strangers as a deer-forest, and one half of the remainder converted into sheep-farms. Overcrowding was the consequence. The crofters and cottars had besides to pay twenty or thirty shillings for land that was so poor that if it had been on the mainland, in an agricultural county, it would have gone back into a state of nature. The herring-fishing, which formerly had enabled the crofters to pay the rent, failed, and the renters were destitute. The commissioners found the people suffering from lack of food, and even threatened with starvation. The raiders were tried at Edinburgh, and sentences passed upon sixteen prisoners, concerned in the disturbances, of from nine to fifteen months' imprisonment. The commissioners appointed by the act reduced the rents on the island of Sanday nearly 49 per cent, and canceled 81 per cent of the arrears. On other estates the reductions were from 30 to 60 per cent, and the arrears were wiped out to the extent of from 40 to 80 per cent. On the estates of the Duke of Argyll the rents were reduced largely, also. See Scotland, Vol. XXI, p. 531; also Vol. XXII, Skye, p. 127, and Sutherland, p. 726.

R. C. Auld.

CROFTON, Sir Walter Frederick, an English prison reformer; born in 1815. In 1833 he entered the Royal Artillery, retiring in 1844 as

captain. Subsequently he became interested in the improvement of prisons and reformatories. He has done much to advance the merits of refuges and reformatories throughout the civilized world. He was knighted in 1862, received the companionship of the Bath, and was made a privy councillor in Ireland.

CROGHAN, George, an American soldier; born near Louisville, Kentucky, Nov. 15, 1791. He graduated at William and Mary College; entered the army in 1810; was promoted captain in 1812, major in 1813, lieutenant-colonel in 1814, and inspector-general, with the rank of colonel, in 1825. For his gallant defense of Fort Stephenson, at Lower Sandusky, he was brevetted lieutenant-colonel, and Congress voted him a gold medal. In 1817 he resigned from the army, and after filling several civic positions, he joined General Taylor in Mexico in 1846, taking part in the battle of Monterey. He died in New Orleans, Jan. 8, 1849.

CROKE, Thomas William, Roman Catholic archbishop of Cashel, Ireland, was born in Mallow, County Cork, May 19, 1828. He studied in Paris and Rome, taking his degree of D.D. at the Roman University in 1847. After various appointments in Ireland and New Zealand, he became archbishop, June 25, 1875, and was identified prominently with the Irish Land League and other national and patriotic movements.

CROLL, James, a Scottish physicist; born at Whitefield, Perthshire, in 1821. He was entirely self-taught, and applied himself to the study of philosophy and physics, and was the author of some works which gained for him a wide reputation as an original thinker. He was apprenticed at first to a millwright, but, on account of an accident, was compelled to give that up. He then became an insurance agent. When he was 25 he began to give much study to metaphysics. In 1859 he was appointed to the curatorship of the Andersonian Museum, in Glasgow, which post he retained until 1867, when he joined the geological survey in Scotland, remaining therewith until his retirement in 1881. He was a fellow of the Royal Society, and among his numerous important works are *The Philosophy of Theism: An Inquiry into the Dependence of Theism on Metaphysics and the Determination of Molecular Motion in Relation to Theism* (1857); *What Determines Molecular Motion? The Fundamental Problem of Nature* (1872); *Climate and Time in their Geological Relations: A Theory of Secular Changes of the Earth's Surface*, which was described as "an epoch-making work," and revolutionized climatological science (1875, 1885); *Discussions on Climate and Cosmology* (1885); *Stellar Evolution* (1889); etc. He died at Perth, Dec. 15, 1890.

CROLY, David Goodman, an American journalist; born in New York City, Nov. 3, 1829. He studied at the New York University, and, after being connected with New York City and other daily journals, became city editor of the New York *World* and then the managing editor, which post he resigned in 1871. He was next managing editor until 1878 of the New York *Graphic*. He married, in 1856, Miss Jane Cunningham ("Jennie June"). He published *Seymour and Blair: Their Lives and Services*, with an appendix containing *A History of Reconstruction* (1868); *Campaign Lives of Seymour and Blair*, an abridgment of the former (1868); *A Positivist's Primer* (1876); *Glimpses of the Future: Suggestions as to the Drift of Things* (1888). He died April 29, 1889.

CROLY, Jane Cunningham, better known as "Jennie June," born at Market Harborough, Leicestershire, England, Dec. 19, 1831. In early life she came to the United States, and married David G. Croly (q.v., above) in 1856, and was engaged as correspondent of many of the principal daily and weekly papers of New York, New Orleans and Baltimore. The first two women's congresses (1856 and 1869) were called by Mrs. Croly, and in 1868 she inaugurated for women the Sorosis Society; she edited the *Home Maker*, a monthly magazine published in New York, and also the *Cycle*, a periodical devoted to women's clubs and to literary reviews; she published several books, among which were *For Better or Worse; Thrown on Her Own Resources; History of Sorosis;* etc. She received the degree of doctor of literature from Rutgers College in 1892. She was elected to the new chair of journalism and literature in that college, and was president of the New York City Women's Press Club, which she established in 1889.

CROMARTY FIRTH, a deep incision into the northeastern coast of Scotland, in Ross County, extending some twenty miles into the land in a southwesterly direction. It is from three to five miles wide, and forms an excellent harbor.

CROMDALE, a place in southern Elginshire, northeastern Scotland, on the right bank of the Spey, 5 miles N.E. of Grantown. Here, May 1, 1690, eight hundred Jacobite Highlanders were surprised and routed by a body of King William's dragoons.

CROMER, a small town and parish, a favorite watering-place in Norfolk, England, 21 miles N. of Norwich. The town has two stations, one on the Great Eastern railway and one on the Midland, and Great Northern Joint railway. The heavy sea has prevented the formation of a harbor, and vessels are compelled to load and unload on the beach. So strong have the encroachments of the sea been that nearly all of the original town, called Shipdon, as well as the parish church, has been swept away. The principal occupation of the inhabitants is crab and lobster fishing in season, and the collection of jet and amber in the winter. The Norfolk and Norwich Hospital maintains a convalescent home of considerable size. The location of the town is so much above sea-level that the lighthouse is visible for 23 miles. The population is about 2,500.

CROMER, Evelyn, Lord, an English financier and diplomat, cousin to the Earl of Northbrook; born Feb. 26, 1841. As Sir Evelyn Baring he was a European commissioner of the public debt in Egypt, and was one of the comptrollers-general representing England and France in 1879, when Tewfik Pasha became ruler in Egypt. He occupied this position until 1880, when he accepted the office of Finance Minister of India under the

Marquis of Ripon, in which capacity he framed and carried three budgets. In 1883 he succeeded Sir Edward Malet at Cairo, with the status of minister. He was created a peer in 1892, with the title of Baron Cromer. He is also a G.C.M.G., a K.C.B., a K.C.S.I., and a C.I.E.

CROMWELL, Richard, a son of Oliver Cromwell, Lord Protector of England; born at Huntingdon, Oct. 4, 1626. He studied law at Lincoln's Inn. When Oliver attained the dignity of Lord Protector, he called his son from the obscurity of a country house to have him elected to Parliament for the counties of Monmouth and Southampton, appointed him First Lord of Trade and Navigation, and made him chancellor of Oxford and a Privy Councillor. In none of these capacities did Richard Cromwell exhibit any aptitude; and his failure as Protector, to which high office he succeeeded in September, 1658, on the death of his father, was still more conspicuous. The result was his demission, a little more than seven months after he had assumed the headship of the commonwealth. He retired to Hampton Court, whence Parliamentary stinginess and pressing creditors soon drove him to the Continent, where he resided for twenty years. At length returning to England, he had a house provided for him at Cheshunt, near London, where he resided in strict privacy until his death, which occurred July 12, 1712. He lacked the character and ambition of his father.

CRONHOLM, Abraham Peter, a Swedish historian; born at Landskrona, Oct. 22, 1809. From 1849 to 1855 he was professor of history at Lund. After his retirement from that post he devoted himself exclusively to literature. He published a large number of valuable historical works, including *Memorials of the Ancient North* (1835); *Political History of Scania* (1846–51); *History of the Reign of Gustavus Adolphus* (1857–72); and an unfinished *History of the Thirty Years' War* (1876–80). He died at Stockholm, May 27, 1879.

CRONWRIGHT-SCHREINER, Olive, better known as Olive Schreiner, the South African novelist; born about 1863, in Cape Town, the daughter of a Lutheran clergyman. When she was twenty years of age she went to London with the manuscript of a novel, *The Story of an African Farm*, which had the good fortune of receiving the approval of George Meredith. The story was published under the pseudonym of "Ralph Iron," and was a great success. It ran through many editions. The book dealt with the spiritual liberation of an idealist temperament from the ultra-Calvinism of the Dutch profession. In 1891 she published *Dreams*, a collection of parables; and in 1893, *Dream Life and Real Life*. She was married Feb. 24, 1894, to Mr. Cronwright, a young colonist, upon which occasion she chosé to be known as Olive Cronwright-Schreiner, Mr. Cronwright at the same time adopting his wife's name. In 1895 he delivered a lecture at Kimberley, South Africa, on *The Political Situation*, which, with the assistance of his wife, has been elaborated into a book, which the authors describe as dealing with "the retrogressive movement in South Africa, and the manner in which it may be stayed." In 1897 she published *Trooper Peter Halket of Mashonaland*.

OLIVE SCHREINER.

CROOK, George, an American soldier; born near Dayton, Ohio, September 8, 1828. A graduate of the United States Military Academy, he entered upon active service with the Fourth Infantry in California in 1852. From 1852 to 1861 he participated in various expeditions against the Indians, during one of which he was wounded by an arrow. At the breaking out of the Civil War he became colonel of the Thirty-sixth Ohio Infantry, and subsequently commanded the Third Provisional Brigade in the West Virginia campaigns. In the summer of 1862 he was engaged in the Virginia and Maryland campaigns, and was brevetted lieutenant-colonel, United States army. July 1, 1863, he was transferred to the Second Cavalry division, and participated in the battles of Tullahoma and Chickamauga. In February, 1864, he was assigned to the command of the Kanawha district in western Virginia, and in the latter part of that year took part in Sheridan's celebrated Shenandoah campaign. In March, 1865, he was brevetted major-general, and was in command of the cavalry of the army of the Potomac until the close of the war. He was mustered out of the volunteer service in January, 1866, and shortly afterward was commissioned lieutenant-colonel of the Twenty-third Infantry, United States army, and sent to Idaho to settle the Indian disturbances. During the six years which followed, General Crook was engaged actively in Indian campaigns. In 1872 he went to Arizona, and compelled the Pi Utes and Apaches to submit, and in 1875 he subdued the Sioux and Cheyenne Indians in the Northwest. In 1882 he drove the Mormons and squatters from the Indian lands upon which they had encroached, and in the following year forced the Chiricahuas to cease their depredations. In this latter campaign General Crook marched over two hundred miles, made over four hundred hostiles prisoners, and captured all their horses and plunder. He was made brigadier-general in 1873, and in 1888 was promoted major-general, United States army. He introduced many reforms in the management of the Indians, the principal one being to compel the contractors to pay the Indians in cash for supplies, instead of store orders. Under his vigorous management the tribes speedily became self-supporting. He died March 21, 1890.

GENERAL CROOK.

CROOKED ISLAND, one of the Bahamas, valu-

able chiefly for its salt, of which it produces about 12,000 bushels annually. Its area is about 160 square miles. Lat. 22° 15′ N., long. 74° W.

CROOKED LAKE. See KEUKA LAKE, in these Supplements.

CROOKES, WILLIAM, an English physicist and chemist; born in London in 1832; was a pupil and assistant of Hofmann at the Royal College of Chemistry, next superintended the meteorological department of the Radcliffe Observatory, and lectured on chemistry at the Science College, Chester. In 1859 he founded the *Chemical News*, and in 1864 became editor of the *Quarterly Journal of Science*. He was elected fellow of the Royal Society in 1863, vice-president of the Chemical Society in 1876, member of the council of the Royal Society the year after, and in 1880 was awarded by the French *Académie des Sciences* an extraordinary prize of 3,000 francs and a gold medal. He took first rank as an authority on sanitary questions, especially on the disposal of the sewage of towns. His method of producing extreme vacua gave a great impulse to incandescent electric-lighting. The Crookes's tube, as used in the Roentgen ray photography, is likewise to be attributed to him. His original researches in chemistry and physics led to the discovery of the metal thallium in 1861, of the sodium amalgamation process for separating gold and silver from their ores in 1865, and of important discoveries in molecular physics and radiant matter, besides the invention of the radiometer. He wrote *Select Methods of Chemical Analysis* (1871), and works on beet-root sugar manufacture, dyeing, and calico-printing, and has translated several works on chemical and metallurgical subjects. In 1883 Mr. Crookes devoted most of his time to researches on the nature and constitution of the rare earths, as interpreted by the "radiant-matter" test, a new method of spectroscopic examination, the outcome of his earlier discoveries on "radiant matter," which seems likely to throw a side light on the origin and constitution of the elements. These studies on the rare earths led him to the conclusion that the bodies which have generally been accepted as elements are "not primordially distinct or independent, but have been formed by a process of evolution remotely analagous to that which we now recognize as having been at work in the formation of organic species." The Society of Arts awarded him, in 1885, a medal for his improvement in the apparatus for the production of high vacua and for his invention of the radiometer. In 1888 the Royal Society also awarded him a medal for his investigations on the behavior of substances under the influences of the electric discharge in a high vacuum. Besides the radiometer and the Crookes tube, he invented the otheoscope in 1877, an instrument similar to the radiometer for showing the seeming repulsion excited by light or heat in an exhausted space. Besides the works indicated above, Professor Crookes devoted considerable study also to psychic force, his works on this subject including *Psychic Power; Spirit Power; Experimental Investigations of W. Crookes, Dr. Huggins, Serjeant Cox, and Lord Lindsay* (1871); *Psychic Force and Modern Spiritualism: A Reply to the Quarterly Review and Other Critics* (1871); a fourth thousand of the latter was issued with the *Correspondence upon Dr. Carpenter's Asserted Refutation of the Author's Experimental Proof of the Existence of a Hitherto Undetected Force* (1872); *Experiments with Psychical Phenomena* (1880). Prof. Crookes was knighted in '97.

CROOKES'S TUBE. See ELECTRICITY, § 95, in these Supplements.

CROOKS, GEORGE RICHARD, an American author; born in Philadelphia, Feb. 3, 1822. In 1841 he became a minister in the Methodist Episcopal Church, and was sent as a missionary to Illinois. In 1842 he was appointed a professor in Dickinson College, and in 1843 became principal of the collegiate grammar school. In 1848 he returned to the ministry, and was pastor successively in Philadelphia, Wilmington, New York and Brooklyn. He was the first editor of *The Methodist*, being chosen in 1860 and serving until 1875. He also prepared several school books, especially the *Latin-English Lexicon*, prepared jointly with Professor Schem. He published *Life of Bishop Simpson; Life of John McClintock;* edited Butler's *Analogy; Theological Encyclopedia and Methodology* (jointly with John Fletcher Hurst). In 1880 he was appointed professor of historical theology in Drew Theological Seminary. Died at Madison, N. J., March 3, 1897.

CROOKSTON, a flourishing city of northwestern Minnesota, capital of Polk County, situated on Red Lake River, about 65 miles N. of Glyndon, in the fertile Red River Valley of the North. It is a commercial and manufacturing center of a rapidly developing region. It is on the Great Northern and Northern Pacific railroads. Population 1895, 3,970.

CROPSEY, JASPER FRANCIS, an American landscape-painter; born in Rossville, New York, Feb. 14, 1823. He first devoted himself to architecture, but, developing unusual genius as a landscape-painter, he received instruction from Edward Maury, and in 1847 visited England, France, Switzerland and Italy, spending three years in the latter place, and producing, among other paintings, the *Pontine Marshes* (1850). In 1855 he again went abroad, and resided seven years in London, his productions being exhibited at the Royal Academy and at the International Exhibition of 1862. He returned to America in 1863, and established a studio in New York. In 1885 he removed his studio to Hastings-upon-Hudson. He was elected a member of the National Academy in 1851, and a member of the American Water-Color Society.

CROPS, FARM, in the United States. See AGRICULTURE, in these Supplements.

CROSBY, HOWARD, an eminent American Presbyterian clergyman; born in New York City, Feb. 27, 1826; died there, March 29, 1891. He graduated at the University of the City of New York in 1844, and became professor of Greek in that institution in 1851, and a professor at Rutgers College, New York, in 1859. In 1861 he was ordained a minister, and became pastor of the First Presbyterian Church of New Brunswick, New Jersey. In 1863 he was called to the pastorate of the Fourth Avenue Pres-

byterian Church, in New York City, which position he retained until his death. In 1859 Harvard College conferred upon him the degree of D.D., and in 1871 Columbia College gave him that of LL.D. From 1870 to 1881 he was chancellor of the New York University. He was one of the founders and chief promoters of the Society for the Prevention of Crime, and from its organization in 1877 was its president. He was a delegate to the First Presbyterian General Council at Edinburgh in 1877. He wrote numerous books, the most noteworthy being *Lands of the Moslem* (1851); *Œdipus Tyrannus of Sophocles* (1851); *Life of Jesus* (1870); *Bible Companion* (1870); *The Humanity of Christ* (1880); *Commentary on the New Testament* (1885); *Bible View of the Jewish Church* (1888); and *The Seven Churches of Asia* (1890). He was a member of the American section of the New Testament Revision Committee.

CROSBY, Peirce, an American naval officer; born at Chester, Pennsylvania, Jan. 16, 1823. He became a midshipman in the navy at the age of 15. From 1842 to 1860 he served on various vessels, having in the mean time been commissioned lieutenant. At the opening of the Civil War he was assigned to duty in Chesapeake Bay, and rendered efficient service in keeping communications open between Annapolis and Havre de Grace. He took a prominent part in the battle of Big Bethel, and in the attack on Forts Hatteras and Clark. He was given command of the gunboat *Pinola* during the winter of 1861–62, and, in addition to other engagements, participated in the capture of New Orleans, and in the passage of the batteries at Vicksburg. He became fleet-captain of the North Atlantic squadron in 1862, having been promoted to commander in September of that year. He subsequently commanded the *Florida*, the *Keystone State*, the *Metacomet* and *Shamokin*. While in command of the *Metacomet* he removed with drag-nets a large number of torpedoes from the approaches to Mobile. He was promoted to a captaincy in 1868, to commodore in 1874, and rear-admiral in 1882. After 48 years of active service he was retired in 1883.

CROSS, Mrs. Mary Ann (or Marian Evans), a celebrated English novelist, better known by her pen-name of "George Eliot," was born at Arbury Farm, Warwickshire, England, Nov. 22, 1820. Her father, Robert Evans, a land-steward on an estate in the vicinity, was a man of strongly marked character, whose portrait, under a partial disguise, is sketched in Adam Bede and Caleb Garth, while some features of her mother's personality may be recognized in Mrs. Poyser, personages who figure in two of George Eliot's most popular novels. Miss Evans attended school for a short time in Nuneaton, and afterward in Coventry, but her education was in the main self-acquired, for from her earliest years she was distinguished by a passionate love of study and had a richly endowed nature, which subsequently enabled her to attain the highest place in imaginative literature. After the death of her mother, she removed in 1841 to Coventry, where she lived alone with her father, pursuing her studies and making the acquaintance of a family of Unitarians, under whose influence her powerful mind received its bent toward rationalism. The first-fruits of this association was her translation from the German of Strauss's *Leben Jesu*. The death of her father in 1849 gave her the opportunity of passing a winter in Switzerland; and on her return to England she established herself in London, where she began to write for the *Westminster Review*, then under the editorship of her friend, Dr. Chapman. To the radical quarterly she made a number of contributions, as well as assisting in the editing of it, and she added to her translations from the German, Feuerbach's *Das Wesen des Christenthums*, or *Essence of Christianity*. Her work for the *Westminster* brought her to the notice of Herbert Spencer, John Stuart Mill and George Henry Lewes, the biographer of Goethe, and a brilliant philosophic essayist. With the latter she formed an irregular union, at variance with the conventional moral sense of society. Lewes had been deserted by his wife, and her offense condoned, so that a divorce was unattainable, and the couple had finally separated.

The alliance with Mr. Lewes, which remained unbroken until his death in 1878, withdrew George Eliot from the conventions of society, and his discernment provided the needed stimulus for undertaking the work of a novelist. At his suggestion, she began those powerful creations which, from the issue of the first installment of the *Scenes of Clerical Life* to *Daniel Deronda*, centered the eyes of the English-speaking world on her work. In 1857 the three sketches which constitute the work first mentioned appeared in *Blackwood's Magazine*. These were followed in 1859 by *Adam Bede*, a powerful novel of real life, revealing a masterly insight into character and a remarkable knowledge of human nature, combined with admirable powers of description. The broader canvas of this work, which remains to-day the most popular of George Eliot's writings, gave fuller scope to its author's powers, a fact which the appearance of the *Mill on the Floss* (1860) emphasizes, for from the publication of the latter novel may be dated the author's assured position as a writer of fiction. In this, and in *Silas Marner* (1861), a less ambitious though very charming story, we begin to see the author's subtle insight into the workings of the human mind, and her fondness for the analytic dissection of her characters. Both deal with the scenes and characters of the rural and manufacturing districts, in which George Eliot's early life had been spent.

GEORGE ELIOT.

With the publication, in 1863, of *Romola*, a historical novel of the period of the Italian Renaissance, George Eliot not only broke new ground, but adopted a more elaborate and pseudo-scientific style, which alienated many admirers, who could not appreciate the erudition which the work manifests, or

its somewhat artificial and labored utterance. Nor did *Felix Holt, the Radical*, which appeared in 1866, and dealt with political and religious questions among the lower classes of English society, do much to restore her lost *clientèle*. This, happily, was recovered by the publication, in 1871–72, of *Middlemarch*, a study of English provincial life, which exhibits its author's powers in the maturity of their development. Though inferior, as a story, to *Adam Bede*, there is, in *Middlemarch*, more "delicacy of detail and completeness of finish," as well as greater breadth of life. The work, as the prelude to it hints, is an arraignment of modern society "for the crippling conditions it imposes on men and women, especially women of high ideal enthusiasm." It describes, and with a note of pessimism born of an openly confessed skepticism, "a life of mistakes, the offspring of a certain spiritual grandeur, ill matched with the meanness of opportunity." But, in spite of this, *Middlemarch* is a great though somewhat cheerless novel, relieved by the doings and sayings of an exceptionally noble and high-minded heroine, and by her creator's love of a high moral ideal, made human by a keen sense of humor.

With *Daniel Deronda* (1876) a reaction again set in, owing partly to the increased artificiality of the author's style, and partly to lack of public sympathy with her enthusiasm over certain modern phases of Jewish life and character. There is, of course, in the story, no lack of labor and art, and, occasionally, there are gleams of a fine humor; but the work, as a whole, is heavy and lifeless, and is marred by a too erudite and grandiose manner. Her prose work after the publication of *Daniel Deronda* was limited to a series of essays on various topics, which appeared, in 1879, under the title of *The Impressions of Theophrastus Such*. Besides this, she published some verse, which, if we except the hymn, *O, May I Join the Choir Invisible*, was too heavy and ornate for popular acceptance, though it is distinguished by an occasional subtle thought, and by not a few artistic felicities of expression. The poetical work embraces *The Spanish Gypsy* (1868), a romantic drama; *Agatha* (1869); *The Legend of Jubal* (1874); and *How Lisa Loved the King* (posthumous, in 1883). The poetic side of George Eliot's genius is, however, best seen in the imaginative creations and the delicate finish of her novels. In moral tone, the latter are without a blemish, save for the depressive, skeptical note which mars some of the author's best work. In 1880 George Eliot married John Walter Cross, a London stock-broker and intimate friend, who, after the novelist's death, which occurred in London, Dec. 22, 1880, published a voluminous biography, entitled *George Eliot's Life as Related in Her Letters and Journals*. The work gives a delightful human picture of her quiet domestic life.

G. Mercer Adam.

CROSS, Southern, the most conspicuous constellation of the southern hemisphere. It consists of four bright stars in the shape of a cross. The two brilliant stars which mark the summit and foot of the cross have nearly the same right ascension. The constellation, therefore, is almost perpendicular when passing the meridian, and these two stars act as pointers to the antarctic pole.

CROSS, Viscount (Richard Assheton-Cross), an English statesman; born near Preston, Lancashire, May 30, 1823. He was educated at Rugby under Dr. Arnold, and at Trinity College, Cambridge. Mr. Cross entered Parliament in 1857, and became Home Secretary under Mr. Disraeli's administration, Feb. 24, 1880, resigning when the Conservatives went out of office in April, 1880. Mr. Cross again served as Home Secretary in the short administration of Lord Salisbury in 1885. After the general election of 1886 he was created a peer, and became Secretary for India in Lord Salisbury's administration. In Lord Salisbury's third Ministry Viscount Cross was again given a place in the Cabinet as Lord Privy Seal. He was made a G.C.B. and a G.C.S.I.

CROSSBOW. See Arms and Armour, Vol. II, p. 557.

CROSSE, Andrew, an English electrician; born at Fyne Court, Somersetshire, June 17, 1784; educated at Brasenose College, Oxford. He inherited an independent fortune, and was able to devote his whole time to experimental research, attaining valuable results. He specially studied the formation of crystals by means of a voltaic battery, and eventually obtained no fewer than 24 crystals of minerals, including crystalline quartz. These discoveries were first announced at the meeting of the British Association for the Advancement of Science in 1836. He also investigated the subject of the application of electricity as a means of improving wines, etc. He made the prediction about the year 1816 that electricity would eventually be used to "girdle the earth" for the purpose of transmitting messages. In 1837 he announced the apparent generation of a species of insect (*Acarus*) during his experimentation with a voltaic battery in solutions of inorganic substances. This brought great ridicule upon himself, but he successfully proved the correctness of his observation. He died July 6, 1855.

CROSSED CHECK, an English banking term, referring to a check across the face of which, slightly diagonally, two parallel lines have been drawn, with the words "*& Co.*" written between, and toward the right or top side, by the drawer of the check. Such a check is said to be crossed "generally," and it renders the check unpayable, except through some bank or banker. When the check is crossed and the full name of the bank written in between the lines, the check is said to be crossed "specially," and it cannot be negotiated, except by presentation at the particular bank whose name is thereon stated. This mode of drawing checks is common in the British Islands, its purpose being to insure the payment of the check to the party in whose favor it is drawn. The crossing of checks and the whole subject of negotiable securities generally is regulated in England by an admirably drawn statute, drafted by M. D. Chalmers, afterwards a judge of county courts, and known as the Bills of Exchange Act, 1882.

CROSS-EXAMINATION is the examination of a witness by the person on the opposite side of the

case from the party who produced the witness, upon the matters concerning which he has testified in his direct examination. In cross-examination the witness may be asked leading questions, and much latitude is permitted to the counsel in asking questions in a manner to suggest the answer expected or desired, especially where the witness appears to be unwilling to disclose anything against the interests of the person calling him. The liberality allowed in cross-examination makes it difficult for a witness to conceal material facts or tell a plausible untruth when examined by a skillful cross-examiner. See EVIDENCE, Vol. VIII, p. 743.

CROSS OF ST. ANDREW. See ANDREW, in these Supplements.

CROTALARIA, a genus of plants of the family *Leguminosæ*, containing numerous species, all natives of warm climates, but cultivated in hot-houses. Many of them have long, straight, slender stems and branches, and some yield valuable fiber, particularly *C. juncea*, the sunn-hemp of India, the fiber of which is now an important article of commerce. *C. sagittalis*, or rattle box, is a common species of the eastern United States.

CROTON, a large genus of the family *Euphorbiaceæ*, chiefly natives of the tropics, but represented by several species in the United States. Many of the species are valuable on account of their various products, found in the latex and seeds; e.g., *C. Eluteria* of the Bahamas, which yields cascarilla-bark, and *C. tiglium*, of tropical Asia, from whose seeds croton-oil is obtained.

CROTON AQUEDUCT AND DAM. This great work is 38.12 miles long, from Croton Lake to the reservoir in Central Park, New York, 4 miles below the Harlem high bridge; 29.63 miles have been cut through solid rock, or occasionally loose soil; 2.37 miles are pipe-line underground, and 1.12 miles are open trench. The site of the new dam is also on the Croton River, and is built partly of masonry and partly of earthwork. It is 1,200 feet long, 680 feet of which are masonry, and about 160 feet high at the highest portion of the masonry section, the foundation extending about 80 feet below the river bed. The base of the dam reaches a thickness of 185 feet, and the crest 20 feet. The highest portion of the earthwork section is 120 feet above the present ground-level, with an apex 30 feet wide, carrying a roadway 18 feet wide. The excavation for the base of the dam is carried down 125 feet. Water in the Croton River is thus raised 36 feet above the top of the older Croton Dam, and thirty-four billion gallons of water can be stored. The new aqueduct, finished in 1890, is a tunnel of about 14 feet in diameter and over 30 miles in length. It is carried through solid rock at an average depth of 500 feet below the surface. It delivers over three hundred million gallons of water in twenty-four hours. The total cost was over twenty-five million dollars. The water is carried under Harlem River by gravity and siphons. It leads, also, to the reservoir in Central Park, which has a capacity of ten million gallons daily. The cost was over twenty-two million dollars. See AQUEDUCT, Vol. II, p. 223.

CROTON RIVER rises in Dutchess County, New York, flows in a southerly direction through the counties of Putnam and Westchester, and about thirty-five miles above New York City enters the Hudson. This river is the chief source of the water-supply for the city of New York, and is about fifty miles long.

CROUCH, FREDERIC WILLIAM NICHOLLS, a song and ballad composer; born in London, England, July 31, 1808, son of a violoncello-player. When a youth he sang in concerts, and received instruction in music from William Watts, of the London Philharmonic Society. He played in the orchestras of the London theaters, and directed the royal band at the coronation of William IV. In 1849 he removed to the United States and gave concerts in various parts of the country. On the outbreak of the Civil War, happening to be in Charleston, he joined the Confederates. He subsequently settled in Baltimore. When a boy he composed his famous and popular song, *Kathleen Mavourneen. Green and Gold* was written in honor of Robert Emmet's birth, and was sung in New York City, March 4, 1896. He died in Portland, Maine, Aug. 18, 1896.

CROW–BLACKBIRD. See GRACKLE, Vol. XI, pp. 26, 27.

CROW INDIANS. See INDIANS, AMERICAN, Vol. XII, p. 832.

CROWE, MRS. CATHERINE (STEVENS), an English authoress; born in Borough Green, Kent, England, in 1800; died in 1876. In 1822 she married Lieutenant-Colonel Crowe of the Royal Army. They made their home in Edinburgh. In 1841 appeared Susan Hopley; in 1843 she published *Men and Women.* These were followed by *Lillie Dawson*, her best novel, (1847); *Night Side of Nature* (1848); *Uncle Tom's Cabin Adapted for Young Persons* (1853); *Irving Lockwood* (1854); *Ghosts and Family Legends* (1858); *Spiritualism and the Age we Live In* (1859); *The Adventures of a Monkey* (1861), etc. Her mind was morbid and despondent, and at one time she had a violent but brief attack of insanity. She wrote supernatural stories, tragedies, juvenile books, and novels.

CROWE, SIR JOSEPH ARCHER, an English journalist, diplomat, and art-writer; born in London, Oct. 20, 1825. He was a special correspondent in the Crimean War, the Indian Mutiny, and the Franco-Austrian War; and in 1857–59 was director of the School of Art at Bombay. In 1860 he was appointed British consul-general at Leipsic, and afterward at Düsseldorf. In 1882 he was made commercial *attaché* at Paris; in 1889 British plenipotentiary to the Samoan conference; in 1890, delegate to the Electric Telegraph Congress in Paris; in 1892, British commissioner to the Anglo-French Niger Delimitation Commission. He published several works on art topics, notably *Early Flemish Painters* (1857); *History of Painting in Italy* (1864); *Life of Titian* (1871); *Life of Raphael* (1877). He was made a K.C.M.G. in 1890, and a C.B. Died in Würzburg, Bavaria, Sept. 7, 1896.

CROWFOOT, a common name of species of *Ranunculus*, or buttercups, and sometimes extended to the whole family *Ranunculaceæ*. The name refers to the fact that the leaves of many species are

three to five cleft. The flowers are commonly yellow, and more or less showy.

CROWN DEBTS. It is a prerogative of the crown to take precedence of all other creditors, and, in England, to recover its debts by a summary process called *extent*. The rule in Scotland, however, is limited to movable or personal property, and the crown has no privilege over a subject in a competition for heritage.

CROWN LANDS, the demesne lands of the English crown. They are now contracted within narrow limits, having been almost entirely granted to subjects. The superintendence of such property as still belongs to the crown is now vested in commissioners appointed for the purpose, called the commissioners of woods, forests and land revenues.

CROWN PIECE, an English silver coin of the value of five shillings, introduced by Henry VIII. It has a standard weight of 436.56 grains, and in United States money is worth about $1.25. The name *crown* is also used as the translation of the French *écu*, which varied in value from six to three francs.

CROWN POINT, a village and the capital of Lake County, northwestern Indiana. It is on the Erie and the Panhandle railways, 41 miles S.E. of Chicago. A number of factories are here located, among them a steel-mill and wagon factories. Population 1890, 1,907.

CROWN POINT, a post village of Essex County, northern New York, on the Crown Point railroad, on Lake Champlain, near the site of a British fort of the same name surprised and captured by Ethan Allen in 1775. The ruins of the fort still exist. Near the village are extensive beds of iron-ore and phosphate of lime. There is a lighthouse at Crown Point. Population 1890, 978.

CROWN–WORK, in fortification, is formed to strengthen a weak front, or to occupy ground which might facilitate the enemy's operations. See FORTIFICATION, Vol. IX, p. 439.

CROWTHER, SAMUEL ADJAI, the first negro Anglican bishop of Africa; born in Yoruba in 1812. His original name was Adjai. He was captured by Mohammedan slave-traders in 1819, and after having been exchanged and disposed of several times, was freed by a British man-of-war and landed at Sierra Leone in 1822. He was transferred to Bathurst, on the west coast of Africa, capital of British Gambia, where he was converted to Christianity in 1825, and took the name of an English vicar who adopted him. After acting as a missionary he accompanied the first Niger expedition in 1841, and was then sent to the Church Missionary College, London, in 1842; was ordained by the bishop of London, and returned to Africa. He accompanied the second Niger expedition (1854). He entered enthusiastically into his missionary work in the different West African possessions of Britain. He was consecrated bishop of Niger territory, in Canterbury Cathedral, June 29, 1864, in which year he was given the honorary degree of doctor of divinity by Oxford University. In 1880 he was presented, on account of his contributions to geographical knowledge, with a gold watch by the Royal Geographical Society of London. He contributed to the study of African languages by publishing *The Grammar and Vocabulary of the Yoruba Language* (1852); *Iscama-Ibe Primer* (1857); *Nupe Primer* (1860); *A Grammar and Vocabulary of the Nupe Language* (1864). He also wrote a *Journal of an Expedition up the Niger and Tshadda Rivers in 1854* (1855); also mission reports and translations of portions of the Scriptures into the languages of West Africa. Died in Africa Dec. 31, 1891. The life of this remarkable man can be studied in detail in *Good out of Evil: An Authentic Biography of the Rev. S. Crowther* (London, 1852); and *The Slave-Boy Who Became Bishop of the Niger* (London, 1888).

CROZER THEOLOGICAL SEMINARY, an institution founded in 1868, in the Baptist interest, by John Price Crozer, a cotton manufacturer, at Upland, Pennsylvania, 14 miles S.W. of Philadelphia. It has an endowment of $378,500, good teaching and library buildings, a gymnasium, Anniversary Hall, professors' houses and grounds twenty acres in extent.

CROZET ISLANDS, a volcanic group to the south of the Indian Ocean, lying between Kerguelen on the east and Prince Edward Islands on the west, about midway between Patagonia and New Zealand. They were discovered by Captain Marion in 1772. They are uninhabited and of no apparent value. Being in the line of vessels plying between Liverpool and Melbourne, they are frequently the scene of shipwrecks.

CRUCIAN CARP (*Cyprinus carassius*), a name applied to the German carp, native of Europe and Asia. It is an excellent food-fish, and is often reared in artificial ponds in the United States.

CRUCIBLES, vessels made of materials capable of being exposed to high temperatures without alteration, and used for fusing substances together, such as the materials for glass-making or metallic ores, with various fluxes to obtain the several metals they yield. Crucibles are generally made of fire-clay, porcelain, graphite, iron, platinum, and, for some special operations, of silver.

CRUCIBLE STEEL. See IRON, Vol. XIII, pp. 342, 343; and IRON AND STEEL, in these Supplements.

CRUCIFERÆ, an important family of dicotyledonous plants found in all countries. The flowers have a calyx of four sepals, which fall off after flowering; a corolla of four petals, which are placed in the form of a cross, whence the name; usually six unequal (*tetradynamous*) stamens and a simple pod with a false partition. The order includes many important vegetables, as the turnip, cabbage, radish, mustard, cress, etc. It also includes many fragrant flowering and ornamental plants, as the sweet alyssum, candytuft, rocket, etc.

CRUELTY TO ANIMALS, THE AMERICAN SOCIETY FOR THE PREVENTION OF, was organized and incorporated April 10, 1866, being the first society organized in America for the protection of animals, its founder and first president being Henry Bergh (q.v., in these Supplements), to whose noble self-sacrifices and untiring energies the cause of animal protection in this country owes its origin. The

history of the society, therefore, is practically an account of the inception and development of his work of animal protection in America.

In 1862 Mr. Bergh was appointed secretary of legation at St. Petersburg. While in Russia he found himself on several occasions constrained to interfere in cases of atrocious cruelty, and but for his official position he would have been exposed to personal violence. His attention thus was directed to the subject of humanity to the brute creation, and while in London, on his way home in 1865, he made the acquaintance of the Earl of Harrowby, then president of the English Royal Society for the Prevention of Cruelty to Animals, who gave him much valuable information concerning the operations of that society in England. On Mr. Bergh's arrival at home, he found that no similar society existed in this country, and he immediately devoted himself to the establishment of one for the United States. At the outset the proposition met with little encouragement, and without the assistance of the press it probably would have failed. On Feb. 8, 1866, Mr. Bergh delivered a lecture in Clinton Hall, in which he pleaded his cause with such force of argument and such warmth of eloquent conviction that expressions of sympathy and offers of assistance were freely made by persons in attendance. The press lent its powerful aid; the lecture was published, in whole or in part, in all the great cities of the country; public sentiment in favor of Mr. Bergh's movement was aroused, and on April 10, 1866, "The American Society for the Prevention of Cruelty to Animals" was incorporated by the legislature of the state of New York. Among the original charter members of the society were many of the most eminent citizens of the city and state of New York.

On the 19th of April, in the same year, Mr. Bergh secured the passage by the legislature of New York of the first law ever enacted in America for the protection of animals. Within twelve months another "act for the more effectual prevention of cruelty to animals" was passed by the legislature of the same state, and, from time to time, additions have been made to it. The legal definition of the word *animal* now includes every living creature except members of the human race, and the words *torture* and *cruelty* include every act, omission or neglect whereby unjustifiable physical pain, suffering or death is caused or permitted. It is worthy of remark that, in his crusade against the established tolerance of everyday abuses, Mr. Bergh was subjected to unabated opposition, being long the object of contumely and reproach on the part of those whose fancied or actual interests were so unexpectedly invaded. But he had the courage of his convictions and fearlessly adhered to his purpose.

The organization and influence of the American society soon led to the establishment of local societies in all parts of the Union and in other countries, on the American continent and elsewhere. The number of local societies in the United States is now 158, and in other American nations 21 societies have been established since 1866, making a total of 179.

The prevention of cruelty to animals has been the beginning of many other humane organizations. Thus in 1874, the society appeared as prosecutor in a case of cruelty to children, and it then appeared to be advisable to organize a separate society for the prevention of cruelty to children. See CHILDREN, in these Supplements.

The establishment of these and other organizations has found a practical expression in the legislation of nearly every state in the Union. There is now hardly a single state in which cruelty of any kind is not forbidden by the law, under stringent penalties for disobedience.

The practical work is not neglected. The officers of the society are clothed with ample police powers. They wear a distinctive uniform, and patrol the streets by day and by night. They have full power to arrest and prosecute offenders against the laws relating to animals. In addition to the uniformed police, the society has over three hundred special agents in different parts of the state, clothed with the same authority and engaged in enforcing the laws for the prevention of cruelty. In the city of New York the society has ambulances for the removal of injured, sick and disabled animals; appliances for the rescue of drowning animals, and animals which have fallen into excavations, and a patrol-wagon which carries with it the necessary apparatus and medicines for rendering aid to injured animals in the streets.

The official organ of the society is *Our Animal Friends*, a monthly magazine which is devoted to the cause of humanity to all living creatures, and which has an extensive and growing circulation.

The headquarters of the New York society are at 10 East Twenty-second Street, New York.

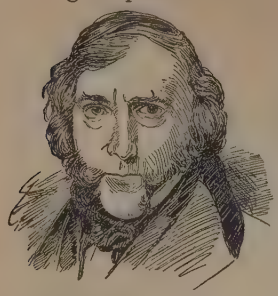
Similar organizations have sprung up, and are as well conducted, in every American city.

The value of the New York society's work may be gauged by the following table of its operations:

SUMMARY OF OPERATIONS FOR NINE YEARS, 1887–1895.

	1887	1888	1889	1890	1891	1892	1893	1894	1895
Cases prosecuted in the courts	797	991	949	986	1,071	1,080	980	1,010	952
Disabled animals temporarily suspended from labor	3,456	1,749	2,357	4,180	5,725	4,868	3,779	3,596	3,403
Horses, mules and other large animals, disabled past recovery, humanely destroyed	2,546	2,455	2,812	2,284	2,620	3,365	3,384	2,927	2,987
Small animals, homeless or disabled past recovery, humanely destroyed	1,202	1,281	705	1,347	2,212	3,060	4,794	24,275	46,898
Disabled horses and other large animals removed from streets in ambulances	522	495	407	520	578	618	607	513	576
Complaints received and investigated	3,773	3,052	2,793	3,609	6,891	7,301	7,599	13,603	21,690

CRUIKSHANK, GEORGE, one of the most gifted of English pictorial satirists; born in London, Sept. 27, 1792. A publication *The Scourge* (1811–16) afforded scope for the display of his satiric genius, and from that time forth he continued to pursue with remarkable success this, his true vein. But in the exquisite series of colored etchings contributed to the *Humorist* (1819–21), and in the etchings to the *Points of Humor* (1823–24), his true artistic power began to be visible. This second, and in many ways finest, period of his art, represented by these works, culminated in the etchings to *Peter Schlemihl* (1823), and to Grimm's *German Popular Stories* (1824–26), which, in the simple directness and effectiveness of their execution, and in their fertile and unencumbered fancy, rank as the artist's masterpieces. Clark's *Three Courses and a Dessert* (1830) and the plates to Scott's *Demonology and Witchcraft* (1830) may be regarded as the last examples of his earlier and simpler method as an etcher. His numerous plates in *Bentley's Miscellany* mark a third period of his art, in which he aimed at greater elaboration and completeness, introducing more complex effects of chiaroscuro, and frequently attaining great power of tragic design. The finest of these are the great series of plates to Dickens's *Oliver Twist* and Ainsworth's *Jack Sheppard* and *The Tower of London* in *Ainsworth's Magazine.* Among the best productions of his later years are the large and elaborate etchings to Brough's *Life of Sir John Falstaff*, published in 1858. His last illustration was the frontispiece to Mrs. Blewitt's *The Rose and the Lily* (1877), "Designed and etched by George Cruikshank, aged 83, 1875." As a water-colorist, he left work marked by considerable skill and delicacy. In his later years he devoted himself to oil-painting. His most important picture was *Worship of Bacchus* (1862), which has been engraved partly by his own hand, a vigorous and earnest protest against the evils of drunkenness; and to the cause of temperance he also devoted many of his designs, especially the tragic and powerful series of *The Bottle* (1847), which, reproduced by glyphography, attained an immense circulation. Died Feb. 1, 1878.



GEORGE CRUIKSHANK.

CRUISERS. See NAVY, in these Supplements.

CRUMMELL, ALEXANDER, an American minister of African descent; born in New York, March 3, 1819. Wishing to adopt the ministry, he applied for admission to the Protestant Episcopal General Theological Seminary in New York City, but was refused on account of his color. In 1842 he was ordained a deacon by Bishop Griswold of Boston, and was later admitted to the priesthood by Bishop Lee of Delaware. In 1848 he went to England, entered Queen's College, Cambridge, graduated in 1853, and then went as a missionary to Liberia, Africa, where he occupied a chair in the Liberian College. He returned to the United States in 1873, and until 1895 was rector of St. Luke's Church, Washington, D. C. He published *The English Language in Liberia: An Address* (1861); *The Future of Africa*, addresses, etc., delivered in Liberia (1862); *The Negro Race not Under a Curse* (1863); *The Greatness of Christ, and Other Sermons* (1882); *Africa and America* (1891). Died in Washington, D. C., Sept. 10, 1898.

CRUTCHED FRIARS, an order of monks which appeared in England in the thirteenth century. They carried in their hands a staff bearing a cross, and hence they received the name of Crosiers (from the French word *croix*, a cross). This name easily became corrupted into Crouched or Crutched, by which the friars were afterward known. They had monasteries in Oxford and Reigate and in London, where the name was given to a street.

CRUYS, CORNELIUS, the founder of Russian maritime power; born June 14, 1657. He was a rear-admiral in the Dutch service, when Peter the Great, noticing his abilities, persuaded him to go to Moscow. There, in 1698, he was received with great splendor, and soon appointed vice-admiral. His services to Russia were of various kinds; to him it owed its first dockyards, canals and charts, the organization of its navy, and its victories over Sweden and Turkey in 1708–10. He died in 1727, possessor of an imperial domain in Kexholm, and owner of the island Birken, in Finland. It is in memory of him that the white flag with the blue cross still floats from the Russian men-of-war.

CRYOPHORUS. See EVAPORATION, Vol. VIII, p. 731.

CRYPTOGAMS, seedless plants; all forms below the *Spermaphytes*, or "flowering plants." See BOTANY, Vol. IV, pp. 92, 140, 157.

CRYPTOPROCTA, an animal closely related to the cats, the largest carnivore of Madagascar. It is five feet long, including the tail. The natives call it the "foussa."

CRYPTOSCOPE is the name given (Feb. 8, 1896) by Professor Salvioni of Perugia, Italy, to an instrument for the purpose of more directly examining the effects of the Roentgen rays on opaque bodies. The instrument consists of a cylinder of cardboard, the inner surface of which is coated with a material such as platino-cyanide of barium, which becomes fluorescent under the action of the rays, the lens being at the end of the cylinder. The object to be examined is placed, with its coverings, between a Crookes tube and the cylinder. The outline or shadow of the concealed object is thrown upon the interior fluorescent surface, and thus becomes apparent to the eye of the observer looking through the lens. The device was simultaneously announced on both sides of the Atlantic, slight modifications occurring in the descriptions. E. P. Thompson of New York City invented a similar appliance, which he called the "kinetoskotoscope," its purpose being intended to render visible, motions occurring within the interior of bodies. But the most efficient of all devices of this kind is Thomas A. Edison's FLUOROSCOPE; q.v., in these Supplements.

CRYSTAL FALLS, a village and the capital of Iron County, Michigan, in the central part of the

Map of
CUBA,
With General Map of
THE WEST INDIES.
Submarine Telegraph Lines :
Railroads :
SCALE OF MILES
KILOMETERS
Longitude West from Greenwich
GULF OF MEXICO
Straits of Florida
ATLANTIC OCEAN
CARIBBEAN SEA
GREATER ANTILLES
Havana
(La Habana)
Matanzas
Cardenas
Pinar del Rio
Isle of Pines
(Isla de Pinos)
Cienfuegos
Santa Clara
Santo Domingo
Trinidad
Puerto Principe
Holguin
Santiago de Cuba
Cape Maisi
Cape Cruz
Golfo de Guacanabo
Gulf of Batabano
Canal Viejo de Bahama
Nicholas Channel
Santaren Channel
Queens Gardens
(Jardines de la Reyna)
Canal de Yucatan
Windward Passage
Mona Passage
Florida Straits
Yucatan Channel
Gulf of Cazones
Gulf of Guacanabo
Bay of Nipe
Bay of Guantanamo
Bay of Santiago de Cuba
Key West
Nassau
Andros
Great Bahama I.
Grand Bahama I.
Cat I.
Long I.
Crooked I.
Mariguana
Caicos Is.
Turk I.
Gt. Inagua I.
Mayaguana
Acklins I.
Cap Haitien
St. Nicolas I.
Tampa
FLORIDA
Punta Rasa
Tortugas
Pinar del Rio
C. San Antonio
C. Catoche
C. Corrientes
C. San Antonio
C. Frances
C. Maisi
C. Cruz
C. Dame Marie
HAITI
Port au Prince
Santo Domingo
SANTO DOMINGO
PORTO RICO
(To U.S.)
San Juan
St. Thomas
Anguilla
St. Bartholomew
Barbuda
St. John
Antigua
Guadeloupe (Fr.)
Dominica
Fort-de France
Martinique (Fr.)
St. Lucia
St. Vincent
Barbados (Br.)
Grenada (Br.)
Curacao (Du.)
Port of Spain
Trinidad
Caracas
La Guaira
Maracaibo
Puerto Cabello
Santa Marta
Barranquilla
Cartagena
Kingston
JAMAICA
(British)
Montego Bay
Falmouth
St. Ann's Bay
Annotta Bay
Ewarton
Savanna-la-Mar
Spanish Town
Port Antonio
Black River
Holland Bay
Kingston
S.E.Pt.
Portland Pt.
Morant Cays
Jamaica
Belize
HONDURAS
Trujillo
Tegucigalpa
NICARAGUA
Corinto
Managua
Lake Nicaragua
Bluefields
CENTRAL AMERICA
NICARAGUA CANAL
Greytown
COSTA RICA
Pt. Limon
San Jose
Colon
Panama
Isthmus of Panama
SOUTH AMERICA
COLOMBIA
VENEZUELA
General Map of the
WEST INDIES.
SCALE OF MILES.
KILOMETERS.
Spanish Squadron destroyed by U.S. Navy, July 3, 1898.
Santiago de Cuba surrendered to U.S., July 14, 1898.
COPYRIGHT, 1899, BY
THE M.-N. CO. BUFFALO, N.Y.

northern peninsula; on the Mequacumeciemecum River, and on the Chicago and Northwestern railroad. Chief industry, iron mining and working. Population 1895, 1,296.

CRYSTAL FALLS, a series of cascades in Cascade Creek, Montana, which, together, measure 129 feet. They are one mile from the mouth of the creek, where it flows into the Yellowstone River.

CRYSTALLINE ROCKS, a name given to all rocks having a crystalline structure. The crystalline texture may be either original or superinduced. Thus, most crystalline rocks, such as certain calcareous masses, owe their origin to chemical precipitation from water, while others, again, such as lavas, have been consolidated from a state of igneous fusion. There is another large class of crystalline rocks, the crystalline granules, some of which present a remarkable foliate character—that is, they are arranged in more or less parallel layers. This peculiar structure appears to have been superinduced—the original rocks having been either fragmental or crystalline, or both—and the result of great heat and pressure.

CRYSTALLOMANCY, a mode of divination by means of transparent bodies, at one time very popular. A precious stone, crystal globe, or other transparent object, was employed; but a beryl was deemed most effective. In using it, the operator first muttered over it certain formulas of prayer, and then gave it into the hands of a youth or virgin, who beheld in it the information required.

CSABA, a town of Hungary, seven miles S.S.W. of Bekes. It has an extensive trade in corn, cattle, fruit, wine, hemp and flax. It has grown in fifty years from a mere village to a city of over thirty-five thousand inhabitants.

CSANAD, a town of eastern Hungary, capital of the county of Csanad, 44 miles N. of Temesvar, on the Maros. It is the see of a bishop. Population, about 5,000. The county, which has an area of about 700 square miles, has a population of over 130,000.

CSAT OR CSATH, a town of central Hungary, in the county of Borsod, 13 miles from Miskolez. Population, 5,000.

CSONGRAD, a town of central Hungary, in the county of the same name, at the confluence of the Theiss and the Koros, 70 miles S.E. of Budapest. Population, 17,500. The county of Csongrad is mostly marshy plain, unhealthful, but very fertile. Grain, hemp, fruits and tobacco are the chief products. Area of county, 1,313 square miles; population, 260,000.

CTENOID FISHES, an order of fishes, recognized by Agassiz, which were characterized by scales notched in a comb-like fashion. The name now is used to designate this form of scale, but the order is obsolete.

CTENOPHORA. See ACTINOZOA, Vol. I, pp. 129, 131.

CUAUHTEMOTZIN, the thirteenth and last Mexican king; born in 1495, ascended the Mexican throne in 1521, and surrendered, with the City of Mexico, to Cortes, in August of the same year. He was subjected to torture in a vain attempt to induce him to disclose the hiding-place of his treasures, and, after being kept in confinement three years, was executed. An elaborate monument surmounted by his statue was erected to his memory in the City of Mexico in 1887. See CORTES, Vol. VI, p. 442.

CUAUTLA, OR CIUDAD MORELOS, a city of Morelas, Mexico, 40 miles E.S.E. of the City of Mexico, on the Morelas railroad. It is situated in a beautiful valley, is well laid out, and clean. Sugar-cane is largely grown in the vicinity. Population 1886, 14,000.

CUAUZA OR KUAUZA, a river of Angola, central western South Africa. It rises in Lake Mussombo, on a plateau 5,500 feet above sea-level, and flows westward to the Atlantic. It is navigable as far as Dondo. Length, 750 miles.

*CUBA, one of the West India islands, and a crown colony of Spain. For its general history, description, products and industries, see CUBA, Vol. VI, p. 678. The island is under a governor-general, assisted by a council of administration, nominated by the Spanish monarch. The island is represented in the Spanish Cortes by 14 Senators and 30 Deputies.

As a result of the revolutionary struggle in the island, all industrial and commercial activity has been paralysed. The island ("Pearl of the Antilles") is one of the best endowed by nature. Ten per cent of the area has been under cultivation, about seven per cent is unreclaimed, and four per cent under forest. Large proportions of the interior are still unexplored. The population in 1894 was stated to be about 1,630,000, 65 per cent of which were whites, the remainder being negroes. Slavery was abolished absolutely by law in 1886. Education was made obligatory in 1880.

The revenue for 1893–94 was 24,440,759 pesos, of which somewhat less than half was from customs. The corresponding expenditure was 25,984,239 pesos, of which about half was for the debt, which is put at $200,000,000, and which was increasing rapidly.

The value of the 90,000 landed estates, in 1892, was 220,000,000 pesos, and the rental 17,000,000 pesos. The live-stock consisted of nearly 600,000 horses and mules, nearly 2,500,000 cattle, 78,000 sheep and 570,000 pigs. The annual yield of sugar averaged nearly 1,000,000 tons, of which the greater part is exported to the United States. More than 240,000 bales of tobacco were exported, and the number of cigars exported exceeded 1,500,000, the number of cigarettes exported being almost 40,000,000 packages. Two thirds of the tobacco and one half of the cigars were exported to the United States. Other exports are rum, mahogany, honey, wax and fruits. The value of the total exports was upward of 89,000,000 pesos, the imports being 56,000,000 pesos, chiefly from Spain, the United States and Great Britain. The chief imports are rice, jerked beef and flour.

The mines are located chiefly in the district of Santiago de Cuba, their extent being 13,727 hectares. There were 1,000 miles of railway and 2,3000 miles of telegraph lines.

The reciprocity treaty entered into between the

* Copyright, 1897, by The Werner Company.

United States and Spanish governments in regard to Cuba and the former was canceled by Spain, Sept. 3, 1894.

This island, called the "Pearl of the Antilles," and also the "Ever-Faithful Island," commanded universal attention on account of its struggle for independence. Discontent has been rife under the oppressive and exacting rule of the Spanish government, which was accused of enforcing the payment of exorbitant taxes to replenish a depleted treasury at home. The struggle of the Cuban insurgents was conducted stubbornly. Before it commenced, there were three parties in the island. One of these was the constitutional party, consisting chiefly of Spanish residents, who favored Spanish monopoly; another party was the autonomists, mostly of native Cuban extraction, who advocated home rule, which party was favored by the Spanish Minister for the Colonies, Señor Maura; the other party was the separatists, who declared for entire independence. This last party, then in the minority, attracted to its side and to the standard of "Free Cuba" the most enlightened Cubans in the island and in America. The practical people of the United States were not slow to express their sympathy with the insurgents. The matter was discussed for three months, from January to April, 1896, in Congress, by both Houses. Sympathy for the Cubans was strong. The result of these debates was, that, April 6, 1896, both Houses adopted the original resolution of the Senate, of February 28th, recommending the recognition of the belligerency of the Cubans, and that the friendly offices of the President should be offered to Spain for the recognition of the independence of Cuba. The resolution had a demonstrative effect in Spain. Popular indignation took the form of riots and of attacks on United States legations. The Spanish government did all in its power to counteract these unruly proceedings, and took no official notice of the resolutions of the American Congress. They waited for a communication from the President. It was stated in Madrid, however, that on the recognition of Cuban belligerency by the United States a memorandum of formal protest would be prepared and sent to all the European powers. President Cleveland, however, declined to take action on the joint resolution, but on April 18, 1896, he sent to the Spanish minister at Washington a message making a friendly offer of mediation on the basis of the granting of reforms and some measure of autonomy. On July 30, 1896, he issued a proclamation warning citizens against violating the neutrality laws.

Public recognition of the Cuban question also occurred at the national political conventions of the Republicans and Democrats, at St. Louis and Chicago, in June and July, 1896. At the former a recommendation was incorporated, expressing sympathy with the Cubans, hopes for their success, and a belief that the United States government "should actively use its influence and good offices to restore peace and give independence to the island." The Democrats extended their sympathy for the insurgents "in their heroic struggle."

The history of the present revolutionary movement in Cuba dates previously to 1893, but in that year the first premonitory symptoms of the present struggle appeared. Rumors of filibustering were rife, and from April to May an incipient revolt was made, and a state of martial law was proclaimed; but the revolt was "snuffed out," the leaders, the Sartorius brothers, surrendering. In the meantime the home government seemed to have come to the conclusion that some concession to the Cubans was necessary, and a scheme of home rule was considered in December, 1894. The "home rule" was to consist of a council, with its seat in Havana, to be composed of twenty-seven members, twelve to be chosen by the government and other government officials, and fifteen by the people. This body was to have control of the budget and to deal with local affairs generally. While this measure was pending in the Spanish Cortes, the revolt received a fresh impetus in the island. In February, 1895, Captain-General Calleja proclaimed martial law in Santiago and Matanzas provinces; and on April 13th the arrival was hailed of José Julián Martí, nominated by the revolutionary junta as secretary-general of the provisional government, and of General Maximo Gomez, who was to take chief command of the revolutionary forces.

The government forces in the island consisted of 9,000 regulars, most of whom were stationed in the western military district, that is, Havana; and the remainder in the eastern district, Santiago. Reinforcements of 4,200 recruits speedily arrived. The civil and military authorities soon reported to the home government that the trouble was at an end, and they kept on so reporting, while the home government was compelled to send constant reinforcements and also to change generals. Marshal Martinez de Campos, in the Senate, March, 1895, reported all danger as past, but recommended that reinforcements be forwarded, as demanded, direct to Santiago, to take the field at once on arrival. It was decided, early in the same month, to send General Campos with strong reinforcements to Cuba; and he speedily embarked with 12,000 additional troops; while two gunboats and a cruiser were also ordered to proceed to the distressful island. The marshal took with him 10,000,000 pesetas in his military chest. The cause of this decision was the defeat of the Spanish troops at Campochulos, which was followed by the resignation of Captain-General Calleja, March 28th. Three days later Antonio and José Maceo, Flor Crombet, Valdes, Dr. Frank Agramonte, and 20 other officers arrived from Costa Rica with an expedition equipped with rifles and cannon, and landed at Duaba, near the eastern extremity of the island. The rebel forces were reported to consist of 7,000 men.

Engagements took place between the Spanish and insurgents, with varying success. April 10th, at Palmarito, Flor Crombet, Cobrero, and Borona, insurgent leaders, were killed. Maceo, who com-

manded the insurgents, escaped through the woods. The insurgents were not dismayed, but proceeded to declare the independence of the island, and to frame a new constitution, April 11, 1895.

Marshal Campos landed at Guantanamo, April 16th, and reports of Spanish victories followed, but these were denied stoutly by insurgent sympathizers. In the middle of April, General Maximo Gomez, with other insurgent leaders, effected a landing in Cuba, being provided with $50,000 in American gold coin. April 14th, the official Spanish report of the battle of Palmarito announced the death of General José Maceo, which was untrue. In the mean time reinforcements were constantly being forwarded from Spain. The troops sent out were mostly young men of about twenty years of age, and raw and unsuitable for such rough warfare.

In May the insurgents determined to extend their operations westward, from Santiago as a base. May 7th, they had more men, more arms and more supplies of every kind than they had had at any time previously. May 12th, there was reported a battle at Jovito, near Guantanamo, in which Colonel Bosch, the Spanish commander, was killed. The insurgents were under the leadership of Maceo. May 20th, another severe engagement took place near Dos Rios, in which José Marti was killed and Gomez wounded. The town of Cristo had been captured and looted by the Cubans, May 16th.

In June, Campos, was compelled to ask for more men and munitions. The home government immediately authorized the raising of 600,000,000 pesetas in case of need, and, if required, the dispatch of 40,000 men, in addition to the 10,000 already in the island.

During June the revolt spread rapidly; loyalist guerrilla bands went over to the Cubans; Canasima, a town near Matanzas, was fired June 10th, and the city of Cienfuegos, in the administrative district of Santa Clara, and the town of Soledad, in the province of Puerto Principe, were, June 22d, in a state of revolt. The insurgent troops numbered, according to Spanish figures, over 20,000 men. At a meeting of the Spanish Cabinet, held at Madrid, June 27th, Señor Canovas del Castillo, Prime Minister, read a dispatch from General Campos, requesting 14,000 fresh troops. The number of troops in the island at the outbreak of the war, including the reinforcements which had subsequently been sent, amounted to 50,000, or, as the Spanish figures admit, over 40,000. The expense to the Spanish government of the war from March 1 to July 1, 1895, was $9,000,000; and after that date it was not less than $4,000,000 a month.

An instance of the inability of the Spanish generals to cope with the Cubans occurred at the battle of Bayamo, July 13th, in which General Santocildes was killed and General Campos narrowly escaped capture by General Maceo. This was a bloody and fierce battle, in which the Cubans showed themselves worthy of the cause of liberty for which they fought. The memory of the battle will survive in their annals as a heroic and desperate, but successful, combat against the traditionary might from which they were determined to be free. By August, Marshal Campos had again to seek fresh men. He received 30,000 more, making the total number of men sent to Cuba over 84,000.

In the beginning of Aug., 1895, General Bartolomé Masso was proclaimed President by the revolutionary forces of the eastern and central provinces, in succession to José Marti, slain May 20th at Dos Rios. The meeting of delegates at Najasas proclaimed a Cuban republic, consisting of five states, and drafted a provisional constitution. General Antonio Masso was designated commander-in-chief of the Cuban army; Señor Gonzalo de Quesada, Secretary of Foreign Relations, with residence in the United States; and the Marquis de Santa Lucia, Minister of the Interior.

General Lopez was appointed by the Spanish government governor-general of Cuba, in order to relieve General Campos from this administrative burden. At the close of August the insurrection was spreading, and the insurgent chiefs were levying taxes on the planters. On the last day of August the insurgents inflicted a severe defeat on the Spanish troops near Ramon de las Yaguas, José Maceo commanding. Each force was about equal as to numbers.

Early in Sept., 1895, 13,000 additional troops were landed in the island. A petition was presented about this time, through General Campos, to the Spanish government, praying for self-government to be granted to Cuba, and representing that this would cause most of the insurgents to submit at once. In the beginning of October the insurgent army amounted to 30,000 men, and was in two divisions, the western occupying the province of Puerto Principe, under General Gomez, the eastern being under General Maceo. The total available troops under the Spanish general, out of 70,000, were only about the same number, 30,000. In Oct., 1895, the Spanish government was negotiating a loan of 75,000,000 francs in Paris.

The Cubans appointed, early in October, a permanent government, and adopted a constitution. The President was Salvador Cisneros; Secretary of War, Carlos Roloff; general-in-chief, Maximo Gomez, and his lieutenant-general, Antonio Maceo. The constitution authorized the vesting of the executive and deliberative functions in the President and the Cabinet. The Cabinet was to consist of four secretaries, who, with the President and Vice-President, were to constitute the ministerial council. No provision as yet was made for a representative government; the judicial department was to be kept apart from the other divisions of government.

In this month the insurgents used dynamite to bombard railroad trains, etc., and continued its use. Baracoa, an important port on the northern extremity of the island, was blown up by the Cubans, October 10th. On Nov. 18–19, 1895, a bloody battle was fought at Taguasco, province of Santa Clara, in which the Spaniards, under General Campos, were defeated by the Cubans, under Generals Gomez and Maceo. As a result of this, 30,000 new troops were dispatched from Cadiz, under General Pando, a former governor of the island, who became lieutenant to General Campos. Pando was known to the Cubans as a harsh ruler. In Dec.,

1895, the Cubans, though at first unsuccessful, at length inflicted a series of defeats on the Spanish troops. During that month the insurgents had invaded the province of Havana; but their projected attack on the capital was prevented. However, in the beginning of 1896 they had fixed the center of their operations at Guanajay, within 45 miles of Havana itself, and Marshal Campos declared martial law in the province. At this time more than half the island, including the provinces of Santiago de Cuba, Puerto Principe and half of Santa Clara, was in possession of the Cubans. The Cubans now carried out the order of July 10th for the destruction of the sugar crop, which the Spanish government proposed to give as security to the French for the new loan.

To secure the coast from the chance of the landing of filibusters and supplies, the naval strength was increased materially. By the middle of January it was estimated that one third of the cane crop had been burned, and grinding ceased. The tobacco crop shared the same fate. Railway traffic was stopped by destroying the cars and engines in the province of Havana. On Jan. 17, 1896, General Campos was recalled to Spain, at his own request, and his place was taken by General Valeriano Weyler, whose reputation for ferocity was a by-word in Cuba. He arrived at Havana, Feb. 10, 1896, and on Feb. 17th issued a proclamation establishing martial law of the sternest sort.

General Weyler's presence in Cuba was evidenced by the reports that reached the United States, and his stringent treatment of American citizens and journalists, which went as far as arrest and imprisonment, provoked the protest of the United States consul, General Ramon O. Williams. In March, Gomez was heard of as ravaging the province of Havana, close to the capital. March 8th, 18,000 additional troops arrived from Spain. The regular insurgent army was estimated to be about 60,000 at this time, of which 43,000 were in the field. About two thirds were well mounted, and about half well armed; the others had shotguns, revolvers, or only the machete, and the latter weapon achieved a fame of its own in this war. It is the implement used by the sugar-planters for cutting the cane. It deals a terrible wound, and the Cubans used it most effectively. The great difficulty with the Cubans is their lack of ammunition. They are able to meet the enemy with only six or eight rounds, hence they have to do their effective work at once, and then retire. Telegraph wire cut in small pieces and wound into balls is used in place of bullets. The only artillery is that captured from the Spanish troops. The chief arm of the Cubans is their splendid cavalry, mounted by seasoned horsemen, whose chief weapon is the terrible machete.

On March 22d, Gomez captured the city of Santa Clara, which he refrained from plundering, but took a large amount of military supplies. He held it only long enough to effect this purpose.

Early in the summer, reports came of the ravages of yellow fever, which made havoc among the susceptible Spanish troops. The result was that the latter deserted in numbers, while the officers petitioned to return home. Under such conditions it is impossible for Spain to subdue the revolt. The insurgents have possession of those sections of the country impenetrable and unknown to the Spanish surveyors.

About April 1, 1896, General Gomez camped between two Spanish columns, and sent a message to each of the Spanish generals that he was there to fight him. He then quietly slipped away; and the two columns, advancing, opened fire upon each other, and did not discover their mistake until some on both sides had been killed.

One of the bloodiest encounters of the war occurred April 14th, at La Chuza, in Pinar del Rio province, 15 miles W. of the trocha (the fortified line of 22 miles crossing the island near Havana). As usual the accounts differed as to the numbers engaged, killed and wounded on either side, but the Spanish troops were driven to the coast, where they were relieved by a warship, which opened fire upon the insurgents. In the beginning of May the Cubans were attacked at one of Maceo's forts, in Pinar del Rio, at Cacarajicara, by General Suarez Ynclan, who had to retreat with considerable loss. On May 6th, the town of Punta Brava, near Havana, fell into the hands of the Cubans after a ten minutes' fight. In the early part of June, Maceo, with a force of 2,500 men, broke through the trocha. It was alleged that in this force were four companies of Cuban women, who, furious to revenge the wrongs they had suffered from the Spaniards, could hardly be restrained from rushing relentlessly upon their wounded foes. Operations then generally ceased on account of the season.

Up to April 15, 1896, the loss occasioned by the burning of sugar plantations was estimated at $4,500,000, and of tobacco (in bales) at $1,000,000. The exportation of leaf tobacco was prohibited, except so far as existing contracts were concerned.

The *Competitor*, a swift schooner, with a cargo of munitions for the Cubans, and with some Cubans and other passengers on board, was captured, April 25th, by a Spanish gunboat, off the northern coast of Pinar del Rio. On board were two Americans and an Englishman, and on May 9th, it was announced that among others they had been condemned to death. Such a storm of indignation and remonstrance arose in the United States and Britain over this affair that a new trial for the prisoners was ordered from Madrid. Other filibustering expeditions included the *Laurada*, *The Three Friends*, *City of Richmond*, *Bermuda* and *Horsa*. The *Laurada* landed her cargo, and *The Three Friends* was successful in her first trip in May, but was captured by the United States cutter *Winona* in June, the latter at the same time capturing the *City of Richmond*. The resulting examinations freed the captain and passengers of both. A similar result was reached in regard to the *Bermuda;* but in the case of the *Horsa* it was decided that she had violated the neutrality laws and the captain was sentenced to an imprisonment of 16 months. On April 13 General Fitzhugh Lee was appointed by President Cleveland United States consul at Havana, in succession to Ramon O. Williams.

In May, 1896, two New York journalists were expelled from the island; and on June 3d an artist of *Harper's Weekly* was imprisoned in Morro Castle, but was released on the American consul producing evidence of the prisoner's American citizenship. Rev. A. J. Diaz was also expelled for alleged abetment of the rebellion, a charge that was not believed by those who were acquainted with the missionary.

On September 15th Colonel Aguelera, with a few followers, while retreating from an insurgent band, attacked a household containing 25 persons, mostly women and children, the latter between one and ten years old. "The children were first pierced with the end of the bayonet, then finished with the machete." Nineteen were butchered and six made their escape. It is said that the colonel and his soldiers boasted of what they had done. Again, near Cuzzo, the same officer came to a house where were three children. The parents were absent, gathering wood for a fire to make breakfast. The colonel ordered the children, between 10 and 14 years of age, to be locked up in the house, after which he ordered his men to set fire to the house. The soldiers at first refused, but under threats of the colonel they were forced to obey. The Spanish papers have been full of "the brave deeds" of this officer, and he was recommended for "suitable recognition." On September 22d news reached the United States of the intended deporting from Havana of 93 political prisoners to the Isle of Pines. On their way to Batabano they were all shot down in a palm grove near Bejucale. Their bodies were afterward horribly mutilated with machetes.

The Cuban forces continued active operations, and harassed the Spanish troops, without, however, achieving decisive results. In July, indeed, small bands reached the outskirts of Havana and created great consternation among its residents. Conflicting claims by both sides made it difficult to decide with whom success lay in the various skirmishes, and charges and countercharges of barbarities in warfare were made by Spaniards and Cubans alike. The nature of the war between the Spanish troops and the insurgents is well set forth by President Cleveland, in his message to Congress of Dec. 7, 1896. In this document he says:

"The insurrection in Cuba still continues with all its perplexities. It is difficult to perceive that any progress has thus far been made toward the pacification of the island. . . . If Spain still holds Havana and the seaports and all the considerable towns, the insurgents still roam at will over at least two-thirds of the inland country." [With the exception of Spanish government] "in the large towns and their immediate suburbs . . . the entire country is either given over to anarchy or is subject to the military occupation of one or the other party. . . . Were the Spanish armies able to meet their antagonists in the open, or in pitched battle, prompt and decisive results might be looked for, and the immense superiority of the Spanish forces in numbers, discipline, and equipment could hardly fail to tell greatly to their advantage. But they are called on to face a foe that shuns general engagements, that can choose and does choose its own ground, that from the nature of the country is visible or invisible at pleasure, and that fights only from ambuscade and when all the advantages of position and numbers are on its side. In a country where all that is indispensable to life, in the way of food, clothing, and shelter, is so easily obtainable, especially by those born and bred on the soil, it is obvious that there is hardly a limit to the time during which hostilities of this sort may be prolonged. Meanwhile, as in all cases of protracted civil strife, the passions of the combatants grow more and more inflamed, and excesses on both sides become more frequent and more deplorable. They are also participated in by bands of marauders, who, now in the name of one party and now in the name of the other, as may best suit the occasion, harry the country at will, and plunder its wretched inhabitants for their own advantage. . . . The Spanish government . . . is acting upon the same theory as the insurgents, namely, that the exigencies of the contest require the wholesale annihilation of property, that it may not prove of use and advantage to the enemy."

In July and September the *Three Friends* succeeded in landing important cargoes of war material for the insurgents, but several members of the expedition were captured by the Spaniards and shot. On July 30th President Cleveland issued a proclamation warning American citizens against breaches of neutrality. Daring and successful attacks by Generals Antonio Maceo and Calixto Garcia so exasperated the Spaniards, both in Cuba and in Spain, that General Weyler was driven to make a show of personal activity, and he took the field; but his so-called campaign resulted in nothing. The Cubans made a raid into Guanabacoa, two miles from Havana, on December 1st, and it seemed as though their boldness might be crowned with success, but the killing of Antonio Maceo (who was ambushed), on Dec. 7th, was a great blow to the insurgent cause. Filibustering still continued, and United States cruisers were occupied in watching and chasing suspected vessels, carrying out the government's principles of fidelity to its declared neutrality with an activity which was more laudable than it was welcome to American sympathizers with the Cuban cause.

Meanwhile, the condition of the island grew rapidly worse, trade being practically annihilated, and the people steeped in misery. In the United States popular feeling against Spanish misrule and the destruction of American interests grew apace, and the government of Spain became anxious concerning the prospects of American intervention. The annual message of President Cleveland in December carefully discussed the situation, and presented for consideration by Congress the difficulties attending the recognition of belligerency or independence, and the questions of armed intervention or the purchase of the island. It also suggested a policy of home rule for Cuba, supported by a guarantee by the United States to the insurgents of the good faith of Spain in carrying out such a scheme. Congress eagerly took up the questions, but practical results were somewhat hindered by side issues of conflict of authority between the President and Congress.

The year 1897 opened with continued Cuban activity and some successes, notably the destruction of

the Spanish gunboat *Relampago*, by a torpedo in the Rio Cauto. In January General Weyler narrowly escaped capture, through the failure of a well-laid plan to entrap him; but in March the Cuban general, Juan Ruis Rivera, was surprised, wounded, and taken prisoner. The use of dynamite by the insurgents wrought much destruction, and caused great demoralization among the Spanish troops.

On the 4th of February the queen regent promulgated, and on the 20th of April decreed, a scheme of reform for the government of Cuba, granting many features of home rule, but reserving much arbitrary power in the hands of the governor-general and the home government. On the prospect of a demand by the United States government for the release of Julio Sanguily, an American citizen charged with conspiracy and sentenced to imprisonment for life, the Spanish authorities granted his discharge on his waiver of the right of appeal.

Despite repeated successes of the insurgents, and the fact that they were in virtual control of a large part of the island, General Weyler reported to his home government that he had effected a pacification of the island. But his idea of pacification was simply the substitution of starvation for military force,—a policy which he proceeded to carry out by means of his infamous order of "reconcentration." This scheme involved the massing of the country people within certain defined areas, where close guard could be kept upon them. The *pacificos* thus affected were gathered into huge camps; their lands were laid waste, and their property was destroyed, so that no sustenance should be left in the country for the insurgents. Thus shut up, with scant supplies and no resources, these peaceful inhabitants were left to rot by starvation and disease until the horrors became too much for even Spanish ears to bear. In the United States the reports from consuls and others aroused public feeling to a high tension, and the proposition in Congress (suggested by the President) to appropriate a relief fund for the alleviation of this suffering led to urgent calls for intervention in any practicable form.

On the 20th of May the United States Senate passed a resolution recognizing the belligerency of the insurgents; but the measure was never acted on by the House of Representatives. Watchful activity in both Houses for American interests continued, and the country manifested its keen interest in the Cuban situation, and a growing impatience.

The capture of the town of Victoria de las Tunas by General Garcia in the early autumn was marked by heavy slaughter of the defeated Spaniards, especially of the guerrilla troops, and public resentment against General Weyler was so aroused in Spain for his loss of a place reported by him to be impregnable that the Spanish government recalled him, and appointed Marshal Blanco to fill the vacancy. The scheme of Cuban autonomy was also put in force about this time; but the insurgent provisional government pursued its own course, and held an election of a president and cabinet for the inchoate Cuban Republic. The plan of autonomy met with little success; the Cubans, now so near their goal of independence, manifesting no interest in its adoption, and even making a formal protest against its establishment.

Meanwhile want and disease ravaged the island, sparing neither the wretched *reconcentrados* nor the raw and unacclimated Spanish levies. Marshal Blanco took steps to ameliorate the condition of the *pacificos*, and issued a proclamation of amnesty to those charged with rebellion. The aid of the International Red Cross Society was invoked for the relief of the suffering, and the accumulating stories of misery aroused not only American generosity, but also a longing to put an end, once for all, to such horrors.

On the 21st of November an adventurous band of Cubans raided Casa Blanca, opposite Havana, and actually saluted the new governor-general in his palace with a volley of rifle-balls.

The year 1898 found the Cubans still bent on gaining their independence by force of arms, despite Governor Blanco's friendly overtures. A Spanish colonel, Joaquin Ruiz, going on a mission to his personal friend, Gen. Nestor Aranguren, of the Cuban army, to attempt to win him to the cause of home rule, was executed by Aranguren, in pursuance of strict military orders and of an oath to put to death all who ventured to broach the subject of autonomy to the patriots. A month later Aranguren was himself entrapped and slain by a Spanish force sent for the special purpose of avenging the death of Ruiz.

With a view to ascertaining whether the reported horrors of reconcentration were facts or merely sensational stories, Senators Proctor, Gallinger, and Thurston visited the island and personally investigated the camps of the *pacificos*. On their return to the United States they addressed the Senate in powerful language and recounted stories of horror that still further keyed up the American people to a high pitch of nervous and wrathful excitement, which found partial vent in an outpouring of pecuniary and substantial aid for the victims of Weyler's inhuman policy. This aid was distributed by the Red Cross Society and other agencies, despite vexatious obstacles thrown in their way by Spanish officials.

Senator Proctor may be quoted in part as follows: "Outside Havana all . . . is desolation and distress, misery and starvation. Every town and village is surrounded by a trocha, a sort of rifle-pit, with a barbed-wire fence on the outer side of the trench, and at frequent intervals small blockhouses . . . loopholed for musketry, and with a guard of from two to ten soldiers in each. Their huts, usually crowded together, have no floor and no furniture." The people "wear but little clothing; . . . the commonest sanitary provisions are impossible. . . . Torn from their homes, with foul earth, foul air, foul water, and foul food or none, what wonder that one-half have died, and that one-quarter of the living are so diseased that they cannot be saved. A form of dropsy is a common disorder. . . . Little children are still walking about with arms and chest terribly emaciated, eyes swollen, and abdomen bloated to three times the natural size. . . . These cases are hopeless."

In Havana much irritation against Americans was manifested by the turbulent Volunteers, and it became necessary for Gov. Blanco to guard the United States consulate. With the avowed object of reëstab-

lishing friendly and social relations between the two governments, the United States battleship *Maine* was ordered to Havana, and she proceeded thither on the 24th of January. On the 15th of February a terrific explosion blew the ship into fragments, and 266 of her crew were killed. (For particulars of this incident and its far-reaching results, see the articles, HAVANA; "MAINE" (THE); UNITED STATES, in these Supplements.)

On the 9th of April Consul-General Lee quitted Havana, and American residents and others sought refuge in the United States and elsewhere from the coming storm of battle. American relief for the reconcentrados was still distributed among the sufferers, but on the 22d of April the blockade of Cuban ports by American ships was begun, and the island was virtually sealed up. The war which followed (see UNITED STATES, in these Supplements), resulted in the relinquishment by Spain of all claim of sovereignty over the island of Cuba, with a provision for its occupation by the United States pending the pacification of the island and the establishment of a stable government. A commission, consisting of Generals James F. Wade and Matthew C. Butler, and Admiral W. T. Sampson, was appointed by the President, on August 16, to arrange the details of evacution with a similar Spanish commission. At noon on the 1st of January, 1899, the Spanish flag was hauled down at Havana and was replaced by the Stars and Stripes, formal possession being given to the American authorities by the representatives of the former great Power that had held the island of Cuba almost uninterruptedly for over four hundred years.

In anticipation of the cession of the island according to treaty, the President, on the 13th of December, appointed Maj.-Gen. John R. Brooke military governor of Cuba, a position similar in its scope to that of the former captains-general. The island has been divided into seven military departments, each under command of an army officer, who is responsible to the governor-general of the island. These departments and their governors are: Havana Province, Gen. Fitzhugh Lee (who returned to Cuba in this capacity on the 14th of December); Havana City, Gen. William Ludlow; Matanzas, Gen. James H. Wilson; Pinar del Rio, Gen. George W. Davis; Puerto Principe, Gen. L. H. Carpenter; Santiago, Gen. Leonard Wood; and Santa Clara, Gen. J. C. Bates.

General Brooke is assisted by a cabinet, the four offices in which are secretaryships of State and Government; Finance; Justice and Public Instruction; Agriculture, Industry, Commerce, and Public Works. The first incumbents are all Cubans.

CUBAGUA, a small island of eastern Venezuela, 30 miles N. N. W. of Cumana, in the Caribbean Sea, between Margarita and the mainland.

CUBIT. See Vol. XXIV, pp. 483–85.

CUCUMBER TREE, a name given to a certain species of *Magnolia*, on account of the appearance of its fruit. The most common cucumber tree is *M. acuminata*, occurring throughout the Alleghany region from Canada southward, and westward into the forest regions of the Mississippi valley. It is a large tree, with thin oblong leaves, and yellowish-green flowers about three inches in diameter. *M. Cordata* a smaller tree, with ovate leaves and lemon-yellow flowers, is the yellow cucumber tree of the southern Alleghanies.

CUCURBITACEÆ, an important family of dicotyledons, of which the numerous species are mostly herbaceous climbers, inhabiting the warmer regions of the globe. The young shoots and leaves of many species are used as pot-herbs, and the persistent rhizomes or roots of others are sometimes esteemed on account of their store of starch. The central importance of the order is due to the characteristic fruit, which is technically known as a *pepo*, but which may be regarded as a large and many-seeded berry, with its more or less succulent pulp protected by a hardened wall. The many specific and varietal forms are known as cucumbers, melons, gourds, pumpkins, squashes, vegetable-marrows, bottle-gourds, etc.

CUCUTA OR SAN JOSÉ DE CUCUTA, a city of northwestern Colombia, in the department of Santander, lat. 7° 50′ N., near the Venezuelan boundary. In the neighborhood are raised great quantities of sugar, panelu, cacao, tobacco and rice. Population, 10,000.

CUDBEAR. See ARCHIL, Vol. II, p. 379.

CUDLIP, ANNIE THOMAS, an English novelist; born at Aldborough, Suffolk, in 1838. Among her most popular books are *Sir Victor's Choice* (1864); *Denis Donne* (1864); *Barry O'Byrne* (1865); *The Honorable Jane* (1892); *No Hero, but a Man* (1894). Her stories were principally society novels written under her maiden name of Annie Thomas. In 1867 she was married to Rev. Pender Hodge Cudlip.

CUDWEED, a popular name of many species of plants belonging to the natural order *Compositæ*, whose stems and leaves are more or less covered with a whitish, cottony down. They may be kept a long time without undergoing much apparent change, and may therefore be reckoned among everlasting flowers. The common cudweeds of the United States are species of *Gnaphalium*.

CUERNAVACA, a city of Mexico, the capital of Morelas, 40 miles S. of the City of Mexico, with which it is connected by rail. It was the winter resort of Cortez and Maximilian, Cortez's palace being now used as a courthouse, and Maximilian's villa as a school. It is in a sugar-cane raising district, and near by are extensive mills. Population, 8,500.

CUERO, a city of southeastern Texas, capital of De Witt County, situated on the Guadalupe River, and on the San Antonio and Aransas Pass and Southern Pacific railroads, 80 miles E. of San Antonio. It contains a number of large cotton-gins and a variety of manufactories. Population 1895, 3,443.

CUEVAS DE VERA, a town of southeastern Spain, 42 miles N.E. of Almeria, situated on the Almanzora, about twenty miles from its entrance into the Mediterranean. It has a fine old Moorish castle, and in the neighborhood are rich old silver-mines, still steadily producing. It has manufactories of hardware, earthenware, wine and oil. Population, 20,02[illegible].

CUFFEE, Paul, an American negro philanthropist; born of free parents at Westport, Massachusetts, in 1759; died Sept. 7, 1818. When but 15 years old his father died, and Paul was thrown upon his own resources. He first learned to read and write, and then applied himself to the study of navigation. In a few years he amassed considerable wealth, which he devoted to the amelioration of his race. He built a schoolhouse at Westport, maintained a teacher at his own expense, and opened it for the free instruction of his neighbors. He became closely identified with the efforts to found a colony of free negroes in Africa, and in 1811 visited Sierra Leone, where he founded the "Friendly Society of Sierra Leone." From there he sailed to England. On his return to America he collected a company of 38 negroes, whom he carried to Sierra Leone in 1815, and founded the first colony of free blacks. He was a member of the Society of Friends, which he joined when a young man.

CUFIC WRITING. See Inscriptions, Vol. XIII, p. 117.

CUICHUNCHULLI, the native name of *Ionidium parviflorum*, a Peruvian plant of the violet family, and used medicinally as an emetic and cathartic.

CUIRASSIERS, a military term for heavy cavalry wearing the "cuirass" and helmet. They represent the troopers of the sixteenth and seventeenth centuries, who were similarly protected. In the British army no regiments are officially styled cuirassiers, but the two regiments of Life Guards and the Royal Horse Guards were given steel cuirasses in 1821, which, however, they do not wear on active service. There are 12 cuirassier regiments in the German army, the cuirass being of white metal with a brass plate. The French, also, have 12 regiments of cuirassiers, having steel cuirasses with a brass plate. Russia has four regiments of cuirassiers, whose cuirass of iron, with a thin layer of copper, weighs thirty pounds. From 13½ to 16 pounds is the weight of those of other armies. Napoleon III at one time maintained a body-guard of cuirassiers, called "Centgardes," who wore cuirasses of aluminium, much lighter than steel ones, but, like them, not proof against a rifle bullet striking them directly.

CULENBORG or KUILENBURG, a fortified town of the Netherlands, situated on the river Leck, 10 miles N.W. of Thiel. It has manufactories of arms, silk fabrics and twist. Population, 7,655.

CULIACAN, a town of Mexico, 90 miles S.E. of Cuialoa, in a fertile tract on the river Culiacan, and the capital of the state of Sinaloa. It is a depot for goods passing between Guaymas and Mazatlan. Much of its wealth is derived from the rich silver-mines in the neighboring mountains. The principal structure in the city is the mint. Population, 10,000.

CULILAWAN BARK, also called Clove Bark, a valuable aromatic, the product of the *Cinnamomum Culilawan*, a tree of the same genus as the cinnamon tree, growing in the Molucca Islands. Its use is commended in cases of indigestion, diarrhœa, etc.

CULLEN, a fishing-town of Banffshire, on the Moray Firth, northeastern Scotland, 67 miles N.W. of Aberdeen by railway. It has a cruciform parish church, founded by Robert Bruce, whose second queen died here, and which in 1543 was made collegiate. Cullen has been a royal burgh since about 1200, and unites with Elgin and five other places to return one member to Parliament. Population, 2,100.

CULLEN, Paul (1803–78), an Irish prelate and cardinal. At one time he was professor of Hebrew in the College of the Propaganda, and later became rector of the Irish College at Rome. In 1849 he was appointed primate of all Ireland. In 1852 he was transferred from Armagh to the see of Dublin, and was made delegate apostolic for life. In 1866 he became a cardinal priest.

CULLMAN, a town and the capital of Cullman County, northern central Alabama, 45 miles N. of Birmingham, on the Louisville and Nashville railroad. It has furniture and wagon factories, but it is principally engaged in fruit-handling, especially grapes. Population 1890, 1,017.

CULLOM, Shelby M., an American statesman; born in Wayne County, Kentucky, Nov. 22, 1829; studied law and practiced at Springfield, Illinois, and in 1856 was elected to the Illinois legislature. Four years later he was re-elected and became speaker. From December, 1865, until March 3, 1871, he represented the Springfield district in Congress. From 1872 to 1874 he sat in the state legislature, and in 1873 was again speaker. In 1876 he became governor of Illinois, was re-elected in 1880, and resigned Feb. 5, 1883, having been elected United States Senator to succeed David Davis. He was re-elected for the term ending March, 1895, and again for the term expiring March, 1901. Senator Cullom nominated General Grant in 1872, and General Logan in 1884, and took a prominent part in railroad legislation. His bill creating the Interstate Commerce Commission was passed in 1886.

SHELBY M. CULLOM.

CULLUM, George Washington, army officer; born in New York, Feb. 25, 1809; graduated at West Point in 1833, entered the engineer corps, rising to the rank of colonel. Until the outbreak of the Civil War he was chiefly engaged in the construction of fortifications and public works at New London, Boston Harbor, New York City, Charleston (Fort Sumter) and New Bedford. In 1861 he was appointed aide-de-camp to Lieutenant-General Winfield Scott, and later was commissioned brigadier-general of volunteers. He was chief of staff to General Halleck, chief of engineers at the siege of Corinth, and projected many engineering undertakings. He was superintendent of the United States Military Academy at West Point from 1864 to 1866. From 1867 to 1874 he was a member of the board of engineers for improving the system of defenses of the United States. In January, 1874, he retired from active service, after which period he devoted himself to literary, scientific and military studies. He was

vice-president of the American Geographical Association, and president of the Geographical Library Society for several years. He published several military memoirs and historical sketches, among which are *Systems of Military Bridges in Use by the United States Army, etc.* (1863); *Campaigns of the War of 1812–15 Against Great Britain* (1879); etc. He died Feb. 28, 1892.

CULMINATION, an astronomical term signifying the passage of a star across the meridian. The star is then at the highest point (*culmen*) of its course, hence the name. The sun culminates at midday.

CULPEPER, a town and the capital of Culpeper County, northern central Virginia, 59 miles S.W. of Washington, on the Southern and Chesapeake and Ohio railroads. It has a school for girls, and stock-raising and gold-mining and farming interests. Population 1890, 1,620.

CULPEPER, THOMAS, colonial governor of Virginia. He was son of John Culpeper, who was created Baron Culpeper of Thoresway, England, in 1644. The son early became one of the owners of Virginia, and in 1669 he purchased the right to the land lying between the Potomac and Rappahannock rivers. In 1673 he, with the Earl of Arlington, received from King Charles II the grant of the whole territory of Virginia for 31 years, and in 1675 the king appointed him governor of the province for life. He did not come to America until 1680, when he caused the governor's salary of one thousand pounds to be doubled, placed the duties on tobacco and merchandise under the entire control of the king, and brought a general amnesty for all past offenses in the province. He soon went back to England, but returned in 1682, hanged the leading "plant-cutters," debased the currency and annulled the privilege of appeal from the governor and council to the assembly. In 1683 he returned to England, in violation of his orders, and, in consequence, was prosecuted and deprived of his office and patent, but was allowed an annual pension until the time of his grant expired. Lord Culpeper was cruel, despotic, mercenary, and indifferent to the welfare of his colony. On his death in 1719, his large estate in Virginia, where a county is named for him, descended to his daughter Catherine, Lady Fairfax.

CULROSS, a seaport town in the southern section of Perthshire, central eastern Scotland, on the Forth River, 22 miles W.N.W. of Edinburgh. It is of interest because it has the remains of Culross Abbey, founded by the Bruces of Carnock and Kinlose, about the end of the sixteenth century. Toward the end of the eighteenth century it was occupied by Lord Dundonald.

CULVERIN. See ARTILLERY, Vol. II, pp. 655, 656.

CUMBERLAND, a city of Maryland and county seat of Allegany County, located on the north bank of the Potomac River, at the mouth of Wells Creek, at the western terminus of the Chesapeake and Ohio canal, and at the southeastern terminus of the Pittsburg, Washington and Baltimore railroad. A bridge crosses the Potomac River at this point. The city contains five public schools and one academy. Its principal public buildings are the courthouse, city hall and jail. Bituminous coal is mined in the vicinity, and large quantities are shipped from this point. It is the third city in the state in population, and has extensive manufacturing interests. Population 1880, 10,963; 1890, 12,729. See CUMBERLAND, Vol. VI, p. 700.

CUMBERLAND GAP, a narrow pass through the Cumberland Mountains, on the line between Kentucky, Tennessee and Virginia, which was considered an important strategic point during the Civil War. The Confederates, having fortified it, held it until June 18, 1862, the Union troops, under Gen. G. W. Morgan taking possession of it the same day. He had, however, to evacuate the position Sept. 11th, destroying the works behind him. The place was occupied again by the Union troops under General Burnside, who, after a four days' siege, compelled the surrender of General Frazer, Sept. 9, 1863. The gap is five hundred feet deep, and in some places only wide enough for one road.

CUMBERLAND ISLAND, an island of Baffin Land, the most eastern part of that land and separated from the mainland by a narrow strait at its northeastern end.

CUMBERLAND MOUNTAINS, a western ridge of the Appalachian system, forming part of the boundary between Virginia and Kentucky. In Tennessee it forms a table-land 2,000 feet above the sea, from which several peaks and ridges rise 2,800 feet above sea-level. It is well timbered with chestnut, hickory, white ash, oak, maple and pine. The ridge consists of Devonian slate, Carboniferous limestone, and the coal formation, which is very extensive.

CUMBERLAND PRESBYTERIAN CHURCH, a flourishing offshoot of the Presbyterian Church, the outgrowth of the Cumberland Presbytery in Tennessee, which came into existence in 1810. The movement can be traced to the revival of 1800, in which the Rev. James McGready's very pointed discourses created dissensions among the members of the Transylvania Presbytery, of which the members of Cumberland County were still a part. Two parties thus were formed in the Presbytery, the revivalists and antirevivalists. The former held the distinctive views which were the cause of the separation from the mother church. Meantime the pressing needs for preachers were so apparent that the Transylvania Presbytery, after a severe struggle, agreed to allow probationers to preach, who had not acquired a complete classical education. In 1802 the Synod of Kentucky divided the Transylvania Presbytery, forming a new one; the Cumberland Presbytery, embracing the county of that name. The Cumberland Presbytery, now having the power to choose its own preachers, licensed and ordained them, with the allowance to "except the idea of fatality." This was the rock upon which the church split. This exception was termed "adopting the confession with reservations" by the opponents of the Cumberland Presbytery, and the matter was brought before the Synod of Kentucky in 1804, at which all the members of the Cumberland

Presbytery were cited to appear, but they did not do so. The following year, a "commission, with synodical powers," met with the Cumberland Presbytery, and proposed to re-examine members already so ordained, but the Presbytery would not submit to this. The Synod in 1806 suspended some of the members of the Cumberland Presbytery for refusing to submit its young men for re-examination, dissolved Cumberland Presbytery, and attached some of its members to Transylvania Presbytery. The ministers and probationers thus cut off from the Synod formed themselves into a council for the purpose of securing the redress of their grievances. Four years passed in fruitless effort in this direction. Feb. 4, 1810, an independent presbytery was formed, to which the name of Cumberland was given, the new presbytery meeting for the first time, March 10th. At this meeting the confession and discipline of the Presbyterian Church was adopted, with the exception of the "idea of fatality," and provisions were made as to the scholarship of licentiates. In 1813 the first Synod was formed, the name of Cumberland being also given to it. It also formulated a doctrinal statement, giving the points of dissent from the Westminster Confession, the statement including the following: "1. That there are no eternal reprobates; 2. That Christ died, not for a part only, but for all mankind; 3. That all infants dying in infancy are saved through Christ and the sanctification of the Spirit; 4. That the Spirit of God operates on the world, or as co-extensively as Christ has made the atonement, in such a manner as to leave all men inexcusable."

The Synod continued until 1828, when it was decided to form a General Assembly, the first General Assembly being held at Princeton, Kentucky, May 19, 1829. The church then consisted of four synods and eighteen presbyteries. The church was now upon a foundation of security. In 1827 a college was organized at Princeton, Kentucky, for the benefit of its clerical students. In 1845 Cumberland University was founded at Lebanon, Tennessee, the activity of which, interrupted during the Civil War, has been extensive, its law school being recognized as the first in the South. Other educational institutions are in existence; the church being besides well organized in all other directions.

CUMBERLAND RIVER, a branch of the Ohio. It rises in the Cumberland Mountains, flows westward, enters Tennessee, returns to Kentucky, flows north and empties into the Ohio. Its length is about 650 miles, and at certain favorable seasons it is navigable for 600 miles.

CUMBRE, La (Sp. "top" or "height"), one of the principal passes across the Andes, on the main road between Santiago, in Chile, and Mendoza, in the Argentine Republic. Its crest is 12,454 feet high.

CUMBRIAN MOUNTAINS, a great knot of mountains nearly fifty miles in length and breadth, in the northwest of England, occupying part of Cumberland, Westmoreland and Lancashire. There are 25 mountain tops upward of 1,500 feet high, while the highest peak, Scaw Fell, is 3,216 feet in height. The Cumbrians are noted for their rugged and picturesque scenery and their beautiful mountain lakes. They are frequented by many tourists.

CUMIANA, a town of western Piedmont, northwestern Italy, in the province of Turin, seven miles N. of Pinerolo, near the right bank of the Cisola. Population, 6,358.

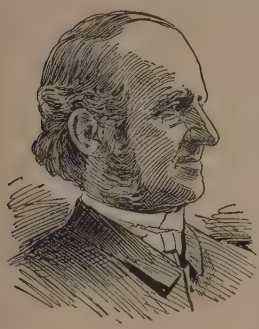
CUMMING, Constance Fredericka Gordon, a Scottish authoress and traveler; born at Altyre, Morayshire, May 24, 1837; daughter of Sir William Gordon Gordon-Cumming, Bart., of Altyre, and sister to Roualeyn-Gordon Gordon-Cumming, the South African lion-hunter. On her mother's side Miss Gordon was descended from the famous Irish beauty, Elizabeth Gunning, Duchess of Argyll. She visited a married sister in the Himalayas, after which she traveled continuously for over twelve years, the results being seen in her various works. She was also a water-color artist, and found great variety of subjects for her skill in such work. Her first book was *From the Hebrides to the Himalayas in 1876*, which appeared later in two separate volumes, each confined to its own subject. Her other works were *A Home in Fiji* (1881); *A Lady's Cruise in a French Man-of-War* (1882); *Fire Fountains*, describing the kingdom of Hawaii, its volcanoes and the history of its missions (1882); *Granite Crags*, a description of a visit to California (1883); *Cornwall to Egypt* (1885); *Wanderings in China* (1885); and *Two Happy Years in Japan* (1892).

CUMMING, John, a Scottish divine and author; born in Fintry parish, Aberdeenshire, Nov. 10, 1807. He was educated at King's College, Aberdeen, where he took his degree of M.A. in 1827, and in 1832 was ordained to the Scotch Church, Crown Court, Covent Garden, London, where he preached with great popularity and success till 1879. Edinburgh University gave him the degree of D.D. in 1844. He was active in philanthropic projects, and as a controversialist and lecturer, both against the party that formed the Scotch Free Church and in the "antipopery" cause; but his celebrity was chiefly due to his writings on the interpretation of prophecy. His audacity in this perilous enterprise drew upon him much ridicule. In 1868 he asked the pope if he might attend the Œcumenical Council, but his application was rejected through Archbishop Manning. His works number over a hundred various publications. Among them are *Apocalyptic Sketches* (3 series, 1848–50); *Prophetic Studies* (1850); *Signs of the Times* (1854); *The Millennial Rest* (1862); *Ritualism the Highway to Rome* (1867); *The Sounding of the Last Trumpet* (1867); and *The Seventh Vial* (1870). After some years of ill health, he died, July 5, 1881.

CUMMINGS, Amos Jay, an American journalist; born in Broome County, New York, May 15, 1841; commenced his career in a printing-office, and was afterward sergeant-major in the Twenty-sixth New Jersey Regiment of infantry, army of the

Potomac; began newspaper life as a compositor on the New York *Tribune*, became political editor of that paper under Horace Greeley, and afterward was connected with the New York *Sun*. In 1886 he was elected to the Fiftieth Congress; declined a renomination, but was elected to the Fifty-first Congress to fill the vacancy caused by the death of Samuel Sullivan Cox, and was re-elected to the Fifty-second and Fifty-fourth Congresses.

CUMMINS, George David, an American bishop; born near Smyrna, Delaware, in 1822. He graduated at Dickinson College in 1841, and at first was licensed as a Methodist minister, but subsequently entered the Protestant Episcopal Church, and after officiating as rector in Baltimore, Norfolk, Richmond and Chicago, was ordained assistant bishop of Kentucky in 1866. In 1873 he abandoned his office, and organized a new sect called "The Reformed Episcopal Church," becoming the first bishop of the new denomination. He died in Lutherville, Maryland, June 26, 1876.



BISHOP CUMMINS.

CUMMINS, Maria Susanna, an American novelist; born at Salem, Massachusetts, April 9, 1827, and began to write about 1850, her first work appearing in the *Atlantic Monthly*. In 1854 her famous book, *The Lamplighter*, appeared, and at once became such a favorite that 40,000 copies were disposed of within eight weeks from its first publication. Her other works include *Mabel Vaughan* (1857); *El Fureidis* (1860); *Haunted Hearts* (1864). She died in Dorchester, now a part of Boston, Oct. 1, 1866.

CUNAXA, an ancient city of Babylonia. See Cyrus the Younger, Vol. VI, p. 753.

CUNDINAMARCA, a department of central Colombia; area, about 92,000 square miles, of which only a small part is inhabited. It is crossed by the eastern Cordilleras, on the east of which is the plain of Cundinamarca, which is very fertile and abounds in cattle. Population 1881, 569,000.

CUNHA MATTOS, Raymondo José da, a Portuguese Brazilian soldier and author; born at Faro, Algarve, Portugal, Nov. 2, 1776. He joined an artillery regiment in 1780, and served under General Forbes in the Roussillon campaign from 1793 to 1796; was stationed on the island of São Thomé, in the Gulf of Guinea, west coast of Africa, 1798–1816, and went the next year to Brazil, chiefly for the purpose of organizing the military school and superintending the building of fortifications. In 1834 he attained the rank of field-marshal. He was in Portugal during the revolutionary crisis there, 1831–32. He published works on his travels in Rio de Janeiro; historical and chorographical works on São Thomé, Minas Geraes and Goyaz; a diary of the attack and defense of the city of Porto; and an index of military law. He was one of the founders of the Instituto e Geographico of Brazil. He died in Rio de Janeiro, March 2, 1839.

CUNNINGHAM, Sir Alexander, an English general and archæologist; born in London in 1814; was the son of Allan Cunningham, the poet. He received a military education, and in 1831 was second lieutenant of engineers; in 1834, aide-de-camp to the governor-general of India; in 1839, was on a special mission to Cashmere; and in 1840 became engineer to the king of Oudh. In 1858 he was chief engineer of the Northwest Provinces, and in 1870 became surveyor-general of Indian archæology. He published several important works on archæological topics, including *An Essay on the Aryan Order of Architecture* (1848); *The Bhilsa Topes; or, Buddhist Temples of Central India* (1854); *The Ancient Geography of India, the Buddhist Period*, a most important and valuable work, serving to solve some of the most difficult questions in regard to much that had been in dispute as to the geography of the East (1871); and *Book of Indian Eras* (1883). He died Nov. 28, 1893.

CUNNINGHAM, William, an adventurer; born in Dublin, Ireland. His father was a trumpeter in the army, and the son was born in the soldiers' barracks. In 1774 he arrived in New York City, where, at first, he gave lessons in riding. At the beginning of the Revolution his hot-headed declarations of Toryism rendered him obnoxious to many, and he was driven from the city. He then went to Boston, continuing his former course. Here he came under the notice of General Gage, who saw in the man a devoted loyalist, and appointed him provost-marshal of the British army. In 1778 he was at first superintendent of the prisons in Philadelphia, and later those of New York City, where he became notorious for many cruelties. At the close of the war Cunningham returned to Europe, and settled in Wales. Later he went to London, where he led a dissipated life, and to obtain money was induced to commit forgery. For this felony he was executed in London, Aug. 10, 1791.

CUNNINGHAMIA, a genus of trees of eastern Asia, of the group *Coniferæ*, nearly allied to the pines and firs, but in foliage resembling the Araucarias. The cone-scales bear three inverted ovules, instead of two, as found in the ordinary pines.

CUP, Divination by, a mode of foretelling events, practiced by the ancient Egyptians. One of the Eastern methods consisted in throwing small pieces of gold or silver leaf into a cup of water, in which, also, were placed precious stones, with certain characters engraved upon them. The infernal powers were then invoked, and were believed to return answer, either in an intelligible voice, by signs on the surface of the water, or by a representation in the cup of the person concerning whom inquiry was made.

CUPAR-ANGUS, a town of central western Scotland, in the counties of Perth and Forfar, 13 miles W.N.W. of Dundee, situated on the left

bank of the Isla. It has extensive linen manufactories and considerable traffic in timber. Population, 4,729.

CUPULE, in botany, an involucre formed by a number of cohering bracts, and surrounding the fruit or the base of the fruit in certain plants; as, the oak, in which it is the cup of the acorn surrounding a single fruit; the beech, in which it is a spiny four-valved husk, surrounding several distinct fruits; the chestnut, in which it is the prickly husk. The term is applied also to the cup-shaped receptacle found on the thallus of certain liver-worts (*Marchantia* and *Lunularia*), in which the reproductive bodies known as *gemmæ* are developed.

CUPULIFERÆ, a family of dicotyledonous plants, consisting of trees and shrubs, natives of temperate climates. The leaves are alternate and furnished with stipules; the staminate flowers, and sometimes the pistillate flowers, are disposed in catkins; the fruit is a one-celled nut in a woody cupule (whence the name of the family); and the seed is usually solitary. This order contains many of the most important trees of Europe and America, including the oak, beech and chestnut.

CURA, a city of Miranda, central northern Venezuela, 60 miles S.W. of Caracas, between the valley of Aragua and the plains of Guarico. It has broad streets and an excellent library. Population, 12,198.

CURAÇAO ORANGES, small oranges which have fallen from the tree long before maturity. They have properties similar to those of orange-peel, but are more bitter and acrid. A sweet liquor, known as curaçao, is made by dissolving the dried orange-peel in alcohol with sirup and spices added, distilling the solution and adding about one per cent of Jamaica rum. The chief center of manufacture is Amsterdam, and the curaçao liqueur is esteemed highly.

CURARI, OURARI, WOORALI OR WOORARA, a celebrated poison, consisting of the aqueous extract of *Strychnos torifera*, and various other species of the same genus, used by the South American Indians for poisoning their arrows. The poison, when introduced into the blood, acts on the nervous system, and produces paralysis, with convulsive movements, and death ensues. Like snake-poison, it is comparatively inert when taken into the stomach.

CURCI, CARLO MARIA, an Italian ecclesiastic; born in Naples, Sept. 4, 1809; entered the Society of Jesus, of which he soon became a distinguished ornament; as a pulpit orator and writer he acquired a high reputation. Three times he was the Lent preacher before the Chapter of San Pietro, in Vaticano, Pope Pius IX being occasionally present to hear him. Father Curci also founded and mainly set forward and contributed to the *Civiltà Cattolica*, which was esteemed so highly by the pope that he provided for its permanent continuance under the management of the Jesuits. In 1871 he was preacher in the great church of the Gesù in Rome. He afterward retired to Florence, devoting himself chiefly to literary work. Certain published views here brought him under censure, but he fully retracted them in 1880. Died at Careggi, near Florence, June 9, 1891.

CURCULIO, a characteristic species of the family *Curculionidæ*, one of the largest families of *Coleoptera*. Over ten thousand species have been described in 1,150 genera. The curculio beetle (*Conotrachelius nenuphar*) lives on the fleshy part of the peach and plum. Broods of these pests live in the black knot of the plum tree. The Curculio appears first as a small, speckled, dark brown insect, which deposits its egg in the green fruit, leaving a slight crescent-shaped puncture. The egg soon hatches, the worm feeding upon the growing fruit, which, as it falls to the ground, liberates the maggot, and it burrows in the ground. In three weeks it again returns as a perfect insect to repeat its attacks on the fruit. The Curculio is very destructive to nearly all smooth-skinned fruit, including the grape, and is found in almost every country on the globe.

CURICO, a town of the department of Curico, southern central Chile. It is on a railroad, and on a branch of the Rapel River. Population, 10,110. The department has an area of 2,913 square miles, and a population, in 1894, reckoned at 107,380. The western and eastern parts are broken up by the coast range and the spurs of the Andes, but the central part is a fertile plain, in which wheat-raising and grazing are extensively carried on.

CURITIBA, a rapidly growing city and the capital of Parana, southern Brazil, on a railroad, 75 miles from the coast town of Paranaguá. It has a good many manufactories of maté, a tea-like beverage. Population, 12,000, of which a good many are German settlers.

CURRENCY QUESTION. See COINAGE, CRIME OF 1873 and FINANCES OF THE UNITED STATES, in these Supplements.

CURRENT-METER. An interesting form of current-meter has been devised and used in studying the deep-sea currents off the Atlantic coasts of the United States. It consists of a weight hung at the lower end of a framework within which is a velocity apparatus with a recording device. The number of rotations of the velocity apparatus within a given time determines the speed of the current. A correct record cannot be obtained unless the apparatus is kept upright. To insure this, a rudder-like extension of the framework is made to carry a traveler, which runs on a rope that may be supported from the farther end of the vessel from which the observation is being taken.

C. H. COCHRANE.

CURRENT RIVER, a stream of Missouri and Arkansas, 250 miles in length. It rises in Texas County, Missouri, flows southeast into Arkansas, where it empties into the Black River, in Randolph County. Its waters are very clear, and abound in fish.

CURRENTS, ALTERNATING. See ELECTRICITY, § 86, in these Supplements.

CURRER BELL, the *nom de plume* of CHARLOTTE BRONTË; q.v., Vol. IV, p. 364. Her two sisters wrote under the names of "Acton Bell" and "Ellis Bell."

CURRY, DANIEL, an American clergyman and author; born near Peekskill, New York, Nov. 29, 1809. He graduated at Wesleyan College in 1837. Subsequently he was principal of Troy Conference Seminary and a professor in the female college at Macon, Georgia. He entered the Methodist ministry in 1841, and was pastor of churches at Athens, Savannah and Columbus. On the separation of the Northern and Southern branches of the Methodist Church he became a member of the New York Conference, filling pastorates at New Haven, Hartford, Brooklyn and New York. In 1864 he was elected editor of the *Christian Advocate*, the official organ of the Methodist Episcopal Church, and continued at the head of that paper until 1876. From 1876 to 1880 he was the editor of the *National Repository*. From 1880 to 1884 he engaged in pastoral work, and then became editor-in-chief of the *Methodist Review*, which office he held at the time of his death. Besides his laborious editorial work, he published *New York: A Historical Sketch* (1853); *Life-Story of D. W. Clark* (1873); *Fragments, Religious and Theological* (1880); *Platform Papers* (1880); *The Book of Job* (1888); etc. He received the degree of D.D. from Wesleyan University in 1852, and the degree of LL.D. from Syracuse University in 1878. Died in New York City, Aug. 17, 1887.

CURRY, JABEZ LAMAR MONROE, an American educator; born in Lincoln County, Georgia, June 5, 1825; graduated at University of Georgia in 1843 and at the Dane Law School of Harvard in 1845. After practicing law for a short period he enlisted as a private in the Mexican War (1846). In 1847 he was elected to the legislature of Alabama, and was re-elected in 1853 and 1855. In 1856 he was an elector to the convention that nominated Buchanan. In 1857 he was elected to Congress as a state's rights advocate, and served until 1861, when he resigned. He was a representative in the first Confederate Congress (1861), and served also in the Confederate army (1864–65) as a lieutenant-colonel of cavalry. He afterward was ordained a Baptist minister, and was president of Howard College, Alabama (1866–68), and professor of English, philosophy and constitutional law in Richmond College (1868–81). In 1881 he was made general agent of the Peabody Fund, with a residence in Washington. From 1874 until 1885 he was president of the foreign mission board of the Southern Baptist convention. In the early part of the latter year he was appointed United States minister to Spain, in which capacity he was able to settle some difficult questions which had been in dispute for years. He received the degree of LL.D. from Mercer University in 1867, and of D.D. from Rochester University in 1871. His publications include *Baptists and Pedobaptists* (1877); *Constitutional Government in Spain* (1889); *William Ewart Gladstone: A Study*, (1891); and *The Southern States of the American Union* (1894).

CURSON, PAUL ALFRED, a French painter; born at Moulinat, near Poictiers, Sept. 7, 1820; studied under Drölling and Cabat, and also in Italy and Greece. The year 1857 brought him his first fame when he exhibited, at the Salon, *Dante and Virgil on the Shores of Purgatory; Blind Greeks;* and *Women of Piscinisco*; the last, a sweet poetic composition. In 1867 he exhibited his famous *Dominicans Decorating their Chapel*. Afterward he exhibited many works dealing with classical subjects, etc. His *Dominicans* and *Ostia* (1868) are hung in the gallery of the Luxembourg. He was a chevalier of the Legion of Honor, and died at Paris, July 22, 1895.

CURSORES, an artificial order in which the struthious birds (ostrich, emu, cassowary, etc.) were formerly associated, with forms having similar habits and superficial resemblances, such as the bustards.

CURTESY is the estate to which a man is entitled at common law in the lands and tenements of his wife. Four things are requisite to entitle a man to this estate: 1. Marriage; 2. Seisin of the wife in the estate; 3. Birth of a child; and 4. Death of the wife. At common law, when all of these circumstances had occurred, the husband was entitled to an absolute estate in his wife's property during his life. When the first three conditions had happened, but before the wife's death, he had an estate called curtesy initiate, which gave him control over her property, but at her death his estate became curtesy consummate. This right has been abolished, or greatly modified, in most states, and the right of dower substituted for it.

CURTIN, ANDREW GREGG, an American public man; born in Bellefonte, Pennsylvania, April 22, 1817. He was admitted to the bar in 1839, and soon became a prominent politician. In 1854 he was appointed secretary of the commonwealth, and *ex officio* superintendent of public schools, and in this capacity did much for the advancement of the school system of the state. In 1860 he was elected governor of Pennsylvania, and was one of the "war governors" during the Civil War. In 1863 he was re-elected governor. In 1869 he was appointed minister to Russia, which position he held until 1872, when he returned to this country. In 1881 he was elected to Congress and served for three successive terms. He died at Bellefonte, Oct. 7, 1894.

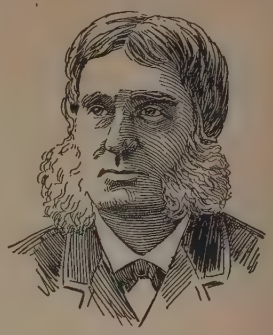
CURTIN, JEREMIAH, an American linguist; born in Milwaukee, Wisconsin, in 1835; graduated at Harvard College in 1863; developed a wonderful faculty for acquiring languages, and on leaving college had a good knowledge of French, Spanish, Portuguese, Italian, Roumanian, Dutch, Danish, Swedish, Icelandic, Gothic, German, Finnish, Greek and Latin. He subsequently mastered the Hebrew, Persian, Sanscrit, Russian, Polish, Bohemian, Lithuanian, Lettish, Hungarian, Turkish, Slovenish, Croatian, Servian, Bulgarian, Mingrelian, Abkhasian and Armenian languages. He

made a study of the American Indian dialects, and attained proficiency in over fifty different tongues. He is on the staff of the Smithsonian Institute, and has published *Myths and Folk-Lore of Ireland* (1889); *Myths and Folk Tales of the Russians, Western Slavs and Magyars* (1890); and *Fairy Tales of Ireland* (1895).

CURTIS, Benjamin Robbins, an American jurist; born in Watertown, Massachusetts, Nov. 4, 1809; died in Newport, Rhode Island, Sept. 15, 1874. He graduated at Harvard College in 1829, and was admitted to the bar in 1832. In 1851 President Fillmore elevated him to the bench of the United States supreme court. His judicial duties being distasteful to him, he resigned in 1857 and returned to the practice of his profession in Boston, Massachusetts. He served two years in the Massachusetts legislature, and was one of the counsel for the defense in the impeachment trial of President Johnson, the answer in that celebrated case being mainly his work. While on the supreme court bench he stoutly maintained the right of Congress to abolish slavery, and dissented from the majority of the court in the Dred Scott case. After retiring from the bench, he edited several series of reports and digests.

CURTIS, George Ticknor, an American lawyer and author, brother of Benjamin Robbins Curtis (q.v.); born in Watertown, Massachusetts, Nov. 28, 1812. He graduated at Harvard College in 1832; was admitted to the bar in 1836, and until 1862 practiced his profession in Boston, when he removed to New York. He sat in the Massachusetts legislature from 1840 to 1844; then became United States commissioner in Boston, and in 1851, while holding this office, he returned a fugitive slave to the slave's owner, for which act he was criticised, although he was a Union advocate, and had previously argued law points in the Dred Scott case, while his brother was sitting on the United States supreme bench. He published *Digest of English and American Admiralty Decisions* (1839); *Digest of the Decisions the Courts of Common Law and Admiralty in the United States* (1840–46); *Rights and Duties of Merchant Seamen* (1841); *American Conveyancer* (1846); *Law of Copyright* (1847); *Law of Patents* (1849); *Equity Precedents* (1850); *Inventors' Manual; Commentaries on the Jurisprudence, Practice, and Peculiar Jurisdiction of the Courts of the United States* (1854–58); *History of the Origin, Formation and Adoption of the Constitution of the United States* (1855–58); *Life of Daniel Webster* (1870); *Life of James Buchanan* (1883); *Creation or Evolution* (1887); *McClellan's Last Service to the Republic* (1886); *John Charaxes: A Tale of the Civil War in America* (1889); *Constitutional History of the United States from 1792–1864.* He died in New York City, March 28, 1894.

CURTIS, George William, an American man of letters; was born in Providence, Rhode Island, Feb. 24, 1824. In 1839 he removed to New York and became a clerk in a mercantile establishment. In 1842 he and his elder brother joined the Brook Farm Community, remaining there a little more than a year, and then spent 18 months longer with a farmer at Concord, Massachusetts. In 1846 Mr. Curtis went to Europe, and spent four years in travel and study, visiting Egypt and Syria. Shortly after his return to this country he became one of the editors of the New York *Tribune.* He was also one of the editors of *Putnam's Monthly* from 1852 to 1857, and being a partner in the firm which published this magazine, was involved heavily in their failure in 1857, sinking his private fortune in meeting the firm's obligations, and devoting all his surplus earnings for the next 16 years to wiping out the firm debt and to save the creditors from loss. In 1853 he established the *Editor's Easy Chair* in *Harper's Monthly*, and ten years later became the political editor of *Harper's Weekly.* He also edited a series of papers in *Harper's Bazar*, entitled *Manners Upon the Road.* For years he was one of the most earnest and consistent advocates of civil service reform, and was one of the members of the commission appointed by President Grant to promulgate rules for the regulation of the civil service. On the lecture platform he was one of the most accomplished and polished speakers of his times, and was generally popular. Among the important political offices he discharged may be mentioned those of delegate to the Republican national conventions of 1860, 1864, and 1876; delegate-at-large to the constitutional convention of New York in 1867; Presidential elector in 1868, and chairman of the Civil Service Commission in 1871–73. He was exceptionally independent and fearless in his political opinions, and was among the first, as he was the leader, of those who broke away from party affiliations and satirically were denominated "Mugwumps." In 1864 Mr. Curtis became one of the regents of the University of the State of New York and in 1890 its chancellor. His published volumes include *Nile Notes of a Howadji* (New York, 1851); *The Howadji in Syria* (1852); *Lotus Eating* (1852); *The Potiphar Papers* (1853); *Prue and I* (1856); and *Trumps*, a novel (1862). He died Aug. 31, 1892.



GEORGE W. CURTIS.

CURTIS, Joseph Bridgham, an American soldier; born in Providence, Rhode Island, Oct. 25, 1836. He served in 1861 in the Ninth New York Volunteers as captain; the same year as second lieutenant in the Fourth Rhode Island Volunteers, and then first lieutenant of the same regiment. He distinguished himself by his daring and coolness at the capture of Roanoke Island, Feb. 7, 1868, and in June was appointed as adjutant-general on General Rodman's staff; then became lieutenant-colonel of the Fourth Rhode Island Regiment. He served in the engagements that occurred in the region between the Rappahan-

nock and Washington, and at Antietam, and was killed while in charge of his regiment at Fredericksburg, Virginia, Dec. 13, 1862.

CURTIS, Josiah, an American physician; born at Wethersfield, Connecticut, in 1816. He graduated at Yale and at Jefferson Medical College, and later visited Europe twice in order to study the sanitary condition of the large cities. In 1860 he superintended the mortality statistics of the United States census, and the same year entered the army, remaining with it until 1865. In 1872 he became surgeon and naturalist to the United States geological survey, and one year later chief medical officer of the Indian service. He has written numerous articles on sanitary surroundings, but is more noted as the discoverer of collodion.

CURTIS, Moses Ashley, an American churchman and writer on botany; born in Stockbridge, Massachusetts, May 11, 1808. He was educated in Williams College, and in 1835, after graduating therefrom, was ordained a clergyman in the Protestant Episcopal Church, settling and beginning his labors in North Carolina. In addition to his ministerial duties, Dr. Curtis became interested in the subject of botany and pursued its study, devoting himself particularly to the department of fungi. His principal publications are *Enumeration of Plants Growing Spontaneously Around Wilmington, North Carolina* (1834); *Contributions to Mycology of North America* (1848); *New Fungi Collected by the Wilkes Exploring Expedition* (1851); *Catalogue of the Plants of North Carolina* (1860); *Esculent Fungi* (1866); *Indigenous and Naturalized Plants of North Carolina* (1867); *Edible Fungi of North Carolina* (1869). He died in Hillsboro, North Carolina, in 1872.

CURTIS, Newton Martin, an American soldier; born in De Peyster, New York, May 21, 1835. He was commissioned captain in the Sixteenth New York Regiment in 1861, and later lieutenant-colonel, and then colonel of the One Hundred and Forty-second New York Infantry. He acquitted himself in various battles with distinction and for his services at the capture of Fort Fisher was promoted on the field brigadier-general, and received a vote of thanks from the legislature of New York. He was brevetted major-general of volunteers in March, 1865, and was mustered out in January of the following year. After the conclusion of the war, Major-General Curtis occupied various important political offices, and was a member of the legislature (1883–85).

CURTIS, Samuel Ives, an American educator and theologian; born at Union, Connecticut, Feb. 5, 1844. He graduated at Amherst in 1867, and at Union Theological Seminary in 1870. He was a pastor in New York in 1870–72, and, after traveling in Ireland and Scotland, was pastor of the American chapel at Leipsic from 1874 to 1878. In the latter year he became professor of Biblical literature in the Congregational Theological Seminary, Chicago, and in the following year was transferred to the chair of Old Testament Literature and Interpretation. Professor Curtis wrote several works on theological subjects, and became one of the editors of the *Bibliotheca Sacra*.

CURTIS, Samuel Ryan, an American soldier; born near Champlain, New York, Feb. 3, 1807. He entered West Point, and graduated therefrom in 1831; resigned in 1832; became a civil engineer, and then from 1841 to 1846 practiced law in Ohio. During this time he served as captain, lieutenant-colonel and colonel of the militia, and adjutant-general of Ohio for the purpose of organizing the state's quota of volunteers for the Mexican War. He served in that war as colonel of the Second Ohio Regiment on General Wool's staff, and as governor of Saltillo, Mexico. At the conclusion of the war he settled in the West, and later served two terms and part of a third as Congressman from Iowa, resigning in 1861 to become colonel of the Second Iowa Regiment. He was in several important battles, and in March, 1862, was promoted major-general of volunteers. At the close of the war he became United States commissioner to examine the Union Pacific railroad. He died in Council Bluffs, Iowa, Dec. 26, 1866.

CURTIUS, Ernst, a German classical archæologist and historian; born at Lübeck, Sept. 2, 1814; was educated at Bonn, Göttingen and Berlin. He visited Athens in 1836, being invited to instruct the young King Otto, and traveled in Greece until 1840. For some time he taught in two Berlin gymnasia; he next became extraordinary professor at the University, and for seven years tutor to the Crown Prince of Prussia; in 1856 he was made professor at Göttingen, whence he was recalled in 1868 to become ordinary professor at Berlin; in 1853 a member of the Royal Academy of Sciences; in 1871 one of its permanent secretaries; in 1864 he commenced his excavations at Olympia, and in 1875 concluded an agreement with the Greek authorities by which he secured to Germany the exclusive right of excavation at that place. He was an ardent Hellenist, and to him was accorded the privilege of realizing the dreams of Winckelmann and lending an enduring fame to the region in which he patiently pursued his researches. His works include *History of Greece; Peloponnesus; Naxos; Olympia; Greek Sculpture by Springs and Streams; Attic Studies; Ancient and Present Times; Materials for the History and Topography of Asia Minor; Atlas of Athens; Maps of Attica; Classical Studies; Anecdota Delphica; Inscriptiones Atticæ Duodecim;* and *Ephesos*. He died in Berlin, July 11, 1896.

CURTIUS, Georg, a German philologist, brother of Ernst Curtius; born at Lübeck in 1820. In 1842 he taught in Dresden, and in 1849 became a professor at Prague. In 1854 he was made professor at Kiel, and in 1862 took charge of the department of classical philology in the University of Leipsic. He published a Greek grammar; *Grundzüge der Griechischen Etymologie; Philologie und Sprachwissenschaft;* and other books. He died in Hermsdorf, Aug. 12, 1885.

CURULE CHAIR, the chair of honor of the

old Roman kings, and later of consuls, prætors, "curule ædiles," and some of the other higher magistrates of the republic having senatorial rank. It was a folding-stool, originally of ivory, then of metal, with curved legs crossing.

CURVES OF RESISTANCE, EQUATIONS OF. See STRENGTH OF MATERIALS, in these Supplements.

CURWEN, JOHN, an English teacher of chorus singing; born in Heckmondwike, Yorkshire, Nov. 14, 1816. He was educated at University College, London, and became assistant minister at the Independent Church of Basingstoke, Hants, and later was co-pastor at Stowmarket, in Suffolk; and in 1844 became pastor at Plaistow, in Essex. He resigned in 1867 to devote himself to the direction of the larger organizations connected with the Tonic Sol-Fa Association, which he had founded in 1853. In 1879 he founded the Tonic Sol-Fa College. His principal work in connection with his life labors was *The Standard Course of Lessons and Exercises on the Tonic Sol-Fa Method*, which appeared in 1861, and the second edition in 1872. He also founded the *Tonic Sol-Fa Reporter*, issued monthly. He died at Manchester, June 26, 1880.

CURZON, GEORGE NATHANIEL, a British statesman, the eldest son of the Rev. Alfred Curzon, Baron Scarsdale; born in 1859; educated at Eton and at Balliol College, Oxford, where he graduated M.A. in 1887. He was a fellow of All Souls' and president of the Union Society, a debating club, where many English Parliamentarians first cultivated their oratorical powers. He was elected for the Southport division of Lancashire in 1886, and subsequently returned for the same constituency, as a Conservative. He was Under-Secretary of State for India in 1891–92, and Under-Secretary for Foreign Affairs in 1895–98. He has traveled extensively, and published *Russia in Central Asia* (1889); *Persia and the Persian Question* (1892); and *Problems of the Far East* (1894). In a debate in the House of Commons in 1895 he took a prominent part in advocating the view that peers, on succession to their titles, were eligible to sit in the Commons if they had not previously sat in the Upper House. The debate arose in connection with the incident wherein Viscount Wolmer, who had been returned as member for West Edinburgh, attempted to take his seat therefor, though subsequent to his election he had succeeded to the peerage upon the death of his father, the first Earl of Selborne. The House declared that the seat of Viscount Wolmer was vacant. Mr. Curzon subsequently introduced a bill to relieve peers from this disability, but the bill was withdrawn May 24, 1895. Mr. Curzon married, April 22, 1895, a famous beauty, Mary Victoria, the eldest daughter of Levi Z. Leiter, a Chicago millionaire, the wedding taking place with much ceremony at the Washington home of the bride's father. On Aug. 12, 1898, he was made governor-general of India; and on Sept. 23, 1898, was created Baron Curzon, of Kedleston, an Irish peerage.

CUSACK, MARY FRANCES, philanthropist; born in Ireland in 1830. In 1859 she became a Roman Catholic and joined a community of Franciscan nuns engaged in teaching poor girls. In 1861 she established a convent of the Sisters of Kenmare. In 1884 she opened the first house of the new order of the Sisters of Peace at Nottingham, England, and the following year a similar house in Jersey City, New Jersey. She published, as "the Nun of Kenmare," numerous works on religious subjects.

CUSCUS. See PHALANGER, Vol. XVIII, pp. 727, 728.

CUSHING, CALEB, an American statesman; born in Salisbury, Massachusetts, Jan. 17, 1800. After graduating at Harvard in 1817 he was tutor of mathematics and natural philosophy there until 1819; studied law; was admitted to the bar in 1822 and began practice in Newburyport. In 1825–26 he served in the legislature; traveled in Europe in 1829–31, and on his return to Massachusetts served again in the legislature. He was elected to Congress in 1835, serving until 1843. He was at first a Jeffersonian Republican, but afterward became a Whig and followed Tyler in his separation from that party. He was nominated three times by President Tyler for Secretary of the Treasury, but was rejected by the Senate. In 1843 he was made United States commissioner to China, and negotiated a treaty July 3, 1844, which was ratified Dec. 31, 1845. Having returned to Massachusetts, Mr. Cushing was elected to the legislature in 1846 and advocated the war with Mexico, and on the refusal of the legislature to appropriate funds for a regiment of volunteers, he advanced the amount from his own purse. Appointed colonel of this regiment, he joined General Zachary Taylor in 1845, served in the Mexican War and was appointed brigadier-general, April 14, 1847. He subsequently was transferred to General Scott's command, remaining with it until the close of the war. In 1850 he served again in the Massachusetts legislature and was made the first mayor of Newburyport. In 1852 he was appointed an associate justice of the supreme court of Massachusetts, and in 1853 was made United States attorney-general. In 1860 he was president of the national Democratic convention and joined the faction of the extreme Southern party, becoming afterward president of the convention that nominated John C. Breckenridge for President. Mr. Cushing was sent to Charleston as the confidential agent of President Buchanan to induce the state troops to defer the attack on Fort Sumter, which mission was unsuccessful. During the Civil War he remained in Washington, and in 1866 was appointed, with two other jurists, to revise and codify the laws of the United States. In 1868 he was sent to the United States of Colombia, on a special

CALEB CUSHING.

diplomatic errand, and in 1870 engaged in preparing the protocol of the treaty of Washington, and afterward the statement to be laid before the tribunal of arbitration, in Geneva, where he was one of the counsel. In 1873 he was nominated as chief justice of the United States, to succeed Chief Justice Chase, but he was not confirmed by the Senate, and in the same year he was made minister to Spain, where he was successful in settling the difficulties arising from the Cuban insurrection. Harvard gave him the degree of LL.D. in 1852. Mr. Cushing published *The Practical Principles of Political Economy* (1826); *Historical and Political Review of the Late Rebellion in France* (1833); *Reminiscences of Spain: The Country, Its People, History and Monuments* (1833); *Growth and Territorial Progress of the United States* (1839); *Life of William H. Harrison* (1840); and *The Treaty of Washington* (1873). His wife published *Letters Descriptive of Public Monuments, Scenery and Manners in France and Spain* (2 vols., 1832). He died in Newburyport, Massachusetts, Jan. 2, 1879.

CUSHING, Frank Hamilton, American ethnologist; born in Erie County, Pennsylvania, July 22, 1857. At an early age he manifested a love for archæological pursuits, and assisted Dr. Charles Rau in the preparation of the Indian collections of the National Museum for the Centennial Exposition at Philadelphia, and was curator for the entire collection until the close of the exhibition. He went in 1879, as assistant ethnologist, with Maj. J. W. Powell's expedition among the Zuñi Indians of New Mexico. Two months had been spent among them, when the expedition returned, leaving Mr. Cushing behind. He adopted the costume, habits and life of the race, and lived as an Indian for three years, studying their habits, language and history. In 1888 he conducted the excavations among the ruins of the ancient city of Cibola. Mr. Cushing has published several works on the Indian customs, Pueblo pottery, identification of Zuñi ruins, and other topics connected with the ethnography of the ancient Arizona Indians.

CUSHING, Luther Stearns, a distinguished American jurist; born in Lunenburg, Massachusetts, June 22, 1803; died June 22, 1856. He graduated at the Harvard Law School in 1826, and subsequently became clerk of the Massachusetts assembly, member of the legislature, judge of the court of common pleas, and reporter of the supreme court. He was an author of several important works, but chiefly is famed as the writer of *Manual of Parliamentary Practice*, known as *Cushing's Manual*, and recognized for many years as the standard textbook on the subject.

CUSHING, Thomas, an American statesman; born in Boston, Massachusetts, March 24, 1725. He graduated at Harvard College in 1744. In 1766 he became a member of the Massachusetts assembly, and was speaker of that body for several years. He was elected to the first Continental Congress in 1774, and was re-elected in 1775. He was a candidate for re-election in 1776, but, owing to his opposition to the Declaration of Independence, was defeated. Subsequently he became lieutenant-governor of Massachusetts, and in 1788 was a member of the convention that ratified the Federal constitution. He died in Boston, Feb. 28, 1788.

CUSHING, William, an American jurist; born in Scituate, Massachusetts, March 1, 1732. He studied law; was made attorney-general of Massachusetts; judge of probate of Lincoln County, Maine, in 1768; judge of the superior court of Massachusetts in 1772, and chief justice in 1777. In 1789 he was appointed associate justice of the United States, and in 1796 declined the chief justiceship. Before the Revolution he was almost alone among the superior officers in supporting the cause of independence. He was one of the founders of the American Academy of Arts and Sciences. He died at Scituate, Sept. 13, 1810.

CUSHING, William Barker, an American naval hero; born in Delafield, Wisconsin, Nov. 4, 1843. He entered the Naval Academy in 1857, but did not graduate, resigning in 1861. A few weeks later he entered the naval service as a volunteer officer, and at once commenced a brilliant career. He secured the first prize taken by the United States navy during the war—a tobacco-schooner. His most distinguished service was the destruction of the Confederate ironclad ram, *Albemarle*, Oct. 27, 1864, at Plymouth, North Carolina. With a steam-launch and volunteer crew, Cushing was able to approach within a short distance of the huge ironclad before he was discovered. Fire was opened upon him from picket posts and from the ironclad, but he ran the launch straight at the huge monster, and swinging the torpedo-boom under the vessel's overhang, coolly discharged the torpedo, the explosion destroying both the ironclad and the launch. Cushing swam to the shore and escaped. For this affair he was thanked officially by Congress and promoted. In 1872 he was advanced to the rank of commander, and was the youngest officer of that rank in the service. He died in Washington, District of Columbia, Dec. 17, 1874.

CUSHMAN, Charlotte Saunders, an American actress; born July 23, 1816, in Boston, Massachusetts. She possessed a remarkable contralto voice, and when twelve years of age began to sing in public in the church choirs of Boston. Her father's financial failure having impoverished the family, her musical education was obtained at the expense of his friends. Her first appearance as an operatic singer was made in 1834, when she appeared in *The Marriage of Figaro*. Her success as a songstress was short-lived, however, for in the same year her voice became impaired from over-straining on high notes. She promptly undertook dramatic

CHARLOTTE S. CUSHMAN.

study, and within a year made her *début* as Lady Macbeth. For five years she appeared in New York City, thence going to Philadelphia, where, from 1842 to 1844, she was lessee of the Walnut Street Theater. In the latter year she accompanied (as leading lady) the English actor Macready in his tour through the United States, and in October sailed for England, where she successfully appeared as Rosalind, Bianca and Lady Macbeth. From this time until her final retirement from the stage in 1875 Miss Cushman's theatrical activity was uninterrupted. Much of her life was spent in Europe, particularly in Rome. Her fame was enhanced by the Shakespearean readings which she gave in the United States, and in which she especially excelled. Her sister Susan, who acted with her for several years, had uncommon ability. *Charlotte Cushman: Her Letters and Memories of Her Life*, was published by Emma Stebbins in 1878. Miss Cushman died in Boston, Feb. 18, 1876.

CUSHMAN, Pauline, an actress and a government spy, the daughter of a Spanish refugee, was born in New Orleans, June 10, 1833. She began her career as a variety actress in Southwestern cities, and in 1863 was employed by the United States government to discover the Southern sympathizers and spies in Louisville, and their methods of conveying supplies across the lines. The same year she went beyond the lines in order to gain information of the strength of the Confederates and their contemplated movements. She was captured and sentenced to be hanged, but was left behind at the evacuation of Shelbyville, where she was found by the Union soldiers, who gave her the title of major. Her knowledge of the roads in the South was of considerable assistance to the army of the Cumberland. She died Dec. 2, 1893.

CUSHMAN, Robert, a Plymouth Pilgrim; born in Kent, England, in 1580; died in England in 1625. He was instrumental in obtaining the patent in which the king granted toleration to the American colonists for their form of religion, and Cushman embarked with his family on the *Speedwell*, Aug. 5, 1620, but returned with that vessel, and remained in England to act as financial agent for the colonists. The next year he went to New England, remaining but about two months, but while there he preached a sermon on *Sin and Danger of Self-love*, which became noted as the first sermon delivered in the New World that was published. It was published in London in 1622, and reprinted in Boston in 1724. While returning to England in 1621, he was captured by the French, held two weeks, and then released. In 1623 he obtained a grant of territory on Cape Ann, where a new band of Pilgrims made the first permanent settlement within the limits of the Massachusetts Bay colony. He died in England in 1625.

CUSSET, a small town in Allier, central France, two miles N.E. of Vichy. It has two mineral springs and is noted for its healthful location and fine scenery. Population, 5,356.

CUST, Robert Needham, an English Orientalist and philologist; born in 1821 in Bedfordshire, England; educated at Eton, and entered her Majesty's Indian civil service. He remained in this employment until 1860, taking an active part in military service, and ardently devoting himself to the study of Oriental languages and customs. Upon his return to England he became a barrister at law. Mr. Cust is the author of *Modern Languages of East Indies; Modern Languages of Africa; Modern Languages of Oceana; Sketches of Anglo-Indian Life;* and, at the Chicago congresses of 1893, presented an important essay upon *The Progress of African Philology.*

CUSTER, a town and the capital of Custer County, southwestern South Dakota, on French Creek, and on the Burlington and Missouri River railroad, among the Black Hills. There is a large amount of lumber and some gold and silver in the vicinity. Population 1890, 790.

CUSTER, George Armstrong, an American soldier; born in New Rumley, Ohio, Dec. 5, 1839. After graduating at West Point in 1861, he at once entered into active service, his first battle being that of Bull Run. Subsequently he was appointed captain and aid to General McClellan, serving on his staff as long as the latter was in command. In 1863 he became aid to Gen. A. Pleasonton, and was appointed brigadier-general. He served with General Grant in the Wilderness, and with Sheridan in the Shenandoah valley. He commanded a cavalry division in the pursuit of Lee after the evacuation of Richmond. After the war he was made lieutenant-colonel, with the brevet of major-general, and assigned to the Seventh United States Calvary. He served on General Hancock's expedition against the Cheyennes and Sioux, and in 1867 he was tried by court-martial for cruelty to his men, and for having left his command without permission. He was suspended for a year, but in 1868, at the request of General Sheridan, was restored, and rejoined his regiment. In 1873 he served in the Yellowstone expedition, and in 1874 was sent to explore the Black Hills. His report of the fertility and mineral wealth of that region led to rapid immigration, and encroachment on the Indian reservation caused trouble with the Sioux, who were led by the famous Sitting Bull. In 1876 General Sheridan ordered an expedition to march against the Indians to settle the troubles. This moved in three columns, under Generals Terry, Gibbon and Crook. General Custer led General Terry's column, and, upon reaching an encampment of the Indians on Little Big Horn River, divided his men into three bodies, and advanced himself with five companies. The Indians concentrated their force upon Custer's division, all of whom, Gen-

GENERAL CUSTER.

eral Custer included, were massacred, June 25, 1876. General Custer was buried at West Point, where a statue of him was erected in 1879.

See *The Complete Life of Gen. G. A. Custer*, by Captain Frederick Whittaker (New York, 1876). His wife, Elizabeth Bacon Custer, is the authoress of *Boots and Saddles* (New York, 1886), and of *Tenting on the Plains; or, Life with General Custer in Dakota* (1888).

CUSTIS, George Washington Parke, an American public man, was born at Mount Airy, Maryland, April 30, 1781. He was the son of Colonel John Parke Custis, who was the first husband of Mrs. George Washington. The son was brought up at Mount Vernon, being adopted into the family of George Washington, and studied at St. John's College and Princeton. In 1802 he left Mt. Vernon and erected Arlington House, near Washington, on a large estate derived from his father. Mr. Custis published *Recollections of Washington* (New York, 1860). Robert E. Lee married the daughter of Mr. Custis. Mr. Custis died at Arlington House, Virginia, Oct. 10, 1857.

CUTHBERT, a town and the capital of Randolph County, southwestern Georgia, 49 miles N.N.W. of Columbus, on the Central Railroad of Georgia. Its industries are principally agricultural. There are two colleges, one for girls and one for boys located here. Population 1890, 2,328.

CUTHBERT BEDE, pseudonym of Bradley, Edward; q.v., in these Supplements.

CUTLER, Manasseh, an American clergyman and botanist; born at Killingly, Connecticut, May 3, 1742. After graduating from Yale, he was admitted in 1767 to the Massachusetts bar. Finding the practice of law uncongenial, he undertook theological study, and in 1770 was licensed to preach. He was ordained pastor of the Congregational society of Hamlet parish, and continued in this relation until his death. During the closing years of the Revolutionary War his parish was without a physician, and Mr. Cutler at once applied himself to the study of medicine, and acquired sufficient knowledge of the science to provide the community with intelligent and skillful medical service. He was much interested in botany, and described more than 350 native species of New England plants. Mr. Cutler was one of the founders of the Ohio Company, an association of Revolutionary officers formed for the purpose of having their bounty lands located together, and for this organization he secured from the government a grant of 1,500,000 acres of land northwest of the Ohio River. He became a member of the Massachusetts legislature, and from 1801 to 1805 served as a Federalist in Congress, declining a re-election. He died at Hamilton, Massachusetts, July 28, 1823.

CUT-OUT, Electric, a device, in numerous forms, for switching, or cutting out, or separating some portion of an electric circuit from the remainder. It is often made with fusible wire connections, so that when too strong a current exists in a circuit the wires may burn out, thus cutting out the rest of the current, as in the interior of a building, and preventing harm to those who have to do with the electrical apparatus. Such a cut-out, placed on a building in an incandescent-light circuit, would prevent interior damage if the outside wires came in contact with the exposed wires of an arc circuit.

CUTTER, the name given to a type of small vessel. The cutters which are used by yachtsmen, smugglers and revenue cruisers, and which are built with special reference to speed, are small vessels with one mast and a bowsprit. See also Sail, Vol. XXI, p. 153.

CUTTHROAT TROUT (*Salmo mykiss*), a fish of the trout family, characterized by a scarlet band on the throat. It is widely distributed throughout western North America. Sometimes it reaches a weight of 25 pounds.

CUTTINGS, branches or portions of branches of trees or shrubs employed to produce new plants, by burying the lower end in the earth so that new roots may arise from the nodes. See Horticulture, Vol. XII, pp. 237, 238.

CUTWORMS, a name given to the larvæ, mostly of lepidopterous *Noctuælitæ*, which eat off the stems, roots or leaves of many cultivated plants. One species ascends orchard trees and destroys the fruit buds.

CUVILLIER-FLEURY, Alfred Auguste, a French author and political writer; born in Paris, March 18, 1802. Louis Bonaparte appointed him his private secretary in 1819, and in 1827 he became the tutor of the young Duc d'Aumale. His career as a writer opened in 1834, when he became connected with the *Journal des Débats*. The articles published by him in this paper in 1872 concerning the plans and methods of the monarchist party brought him temporarily into great prominence. His numerous writings include *Studies and Portraits; Historical and Literary Studies;* and *Political and Revolutionary Portraits*. He died in Paris, Oct. 18, 1887.

CUYAHOGA FALLS, a town of Summit County, northeastern Ohio, three miles N.E. of Akron, on the Cuyahoga River, and on the Pittsburg and Western railroad. It manufactures extensively, principally clay-working machines, electrical machines, turbine water-wheels and wire-machines. It has abundant water-power and medicinal waters. Population 1890, 2,614.

CUYO, a port of Chile, which in colonial times extended east of the Andes. But difficulty of communication, on account of Araucanian wars, which blocked the best passes of the Andes, made its connection with Chile impracticable, and it was accordingly transferred to the new viceroyalty of Buenos Ayres, and the Andes were made the western boundary of Chile.

CYANEA, a genus of jelly-fishes of the class *Acraspeda* (*Scyphomedusæ*). The animal is a disk-shaped, jelly-like bell, of a reddish-brown color, varying from a few inches to several feet in diameter. The slender, thread-like tentacles are arranged in bundles, and are of great length.

CYANIDE PROCESS. See Gold and Gold-mining, in these Supplements.

CYANIDES OR SALTS OF PRUSSIC ACID. See CHEMISTRY, Vol. V, pp. 554, 555.

CYANITE, KYANITE OR DISTHENE, a mineral composed of alumina and silica. See MINERALOGY, Vol. XVI, p. 408.

CYANOGEN (CN or Cy), although intrinsically of little importance, is one of the most interesting compounds of carbon. Cyanogen forms poisonous compounds with metals, forming *metallic cyanides*, of which the best known is the *cyanide of potassium*, a salt of much importance in photography. With hydrogen it forms the deadly prussic or hydrocyanic acid, while it is united with oxygen in cyanic acid. See CHEMISTRY, Vol. V, p. 554.

CYANOTYPE PROCESSES, in photography, those processes in which the compound radical cyanogen is employed; they were discovered by Sir John Herschel. The process is employed in the making of the so-called "blue-prints." See PHOTOGRAPHY, Vol. XVIII, p. 832.

CYATHEA, a genus of tropical tree-ferns, characterized by its cup-shaped indusium. It forms the type of the family *Cyatheaceæ*, which includes the principal tree-ferns of palm-like habit. This family numbers about two hundred species, all tropical, and which form forests in certain parts of Australia. *C. medullaris* of New Zealand is one of the most common tree-ferns in cultivation.

CYATHOPHYLLUM, a genus of fossil stony corals, with a simple or branched polyparium, internally lamellated, the lamella having a quadripartite arrangement. The older portions are cut off by transverse "tables," or septa, and the base of the stem is often supported by root-like processes. This genus first appeared in the Silurian, was abundant in the Devonian, and disappeared at the close of the Carboniferous epoch. See also *Cyathophyllidæ*, under CORALS, Vol. VI, p. 383.

CYAXARES. See PERSIA, Vol. XVIII, p. 563.

CYCADS, a group of plants. See VEGETABLE KINGDOM, Vol. XXIV, p. 131.

CYCHLA, a genus of fishes of the family *Chromidæ*. They are remarkable for the beauty and brilliancy of their colors, and some of them are highly esteemed for the table. In form and habits they resemble the sunfishes.

CYCLAMEN, a flowering plant. See HORTICULTURE, Vol. XII, pp. 251, 263.

CYCLE, a term used in chronology to denote an interval of time in which certain phenomena recur in the same order. Cycles have chiefly arisen from the fact that neither the year (the period of the earth around the sun), nor the month (the period of the moon around the earth), can be measured by days, or even by hours, so exactly as not to leave fractions. Cycles eliminate these fractions, since they are reckoned from the time a heavenly body is in a particular relation with the earth to a time when it again occupies the same place in the heavens and calendar. See *Solar Cycle*, *Lunar Cycle* and *Cycle of Indiction*, under CALENDAR, Vol. IV, pp. 669, 670; and *Metonic Cycle*, under ASTRONOMY, Vol. II, p. 747.

CYCLOBRANCHIATA, a name formerly applied to a group of mollusks in which the gills were circularly arranged. This was highly artificial, and is now obsolete.

CYCLODUS, a genus of lizards of the family *Scincidæ*, found in Australia and the neighboring islands.

CYCLOID. If a circle roll along a straight line in its own plane, any point on the circumference describes a curve which is called a cycloid. This is the most interesting of what are called the transcendental curves, both from its geometrical properties and its numerous applications in mechanics. In dynamics, for example, we find that a heavy particle descends from rest from any point in the arc of an inverted cycloid to the lowest point in the same time exactly, from whatever point of the curve it starts. See INFINITESIMAL CALCULUS, Vol. XIII, p. 53.

CYCLONES. See METEOROLOGY, Vol. XVI, pp. 154, 155; and in these Supplements.

CYCLOPEAN WALLS. See ARCHITECTURE, Vol. II, pp. 402, 452.

CYCLOPS, a genus of small fresh-water crustaceans, type of a family *Cyclopidæ* in the order *Copepoda*. See CRUSTACEA, Vol. VI, p. 664.

CYCLOSIS, the name employed to designate certain protoplasm confined within a cell-wall. These movements are characteristic of all cytoplasm, and appear as currents setting in various directions, sometimes steadily about the cell-walls, sometimes along strands connecting the wall cytoplasm with that investing the nucleus, flowing in one direction for a time, and then perhaps reversing it. The currents are made visible from the fact that the cytoplasm current carries numbers of opaque granules. This movement is also known as "circulation" and "rotation," and is easily seen in the body-cells of the *Characeæ*, leaves of *Anacharis* and *Vallisneria*, stamen-hairs of *Tradescantia*, etc.

CYDNUS, a river of Asia Minor. See ASIA MINOR, Vol. II, p. 709.

CYLINDER PRESS. See PRESSES, in these Supplements.

CYMA, in architecture. See ARCHITECTURE, Vol. II, pp. 408, 463.

CYMBALS, a pair of concave metal plates, which, when struck one against the other, produce a loud, harsh sound of no fixed pitch. They vary in size from small finger-cymbals, or castanets, to large orchestral cymbals intended for use with the large drum. The notes in music for this instrument are all placed on the same line or space, in rhythmical succession. Instruments somewhat similar in character are known to have been in use since the earliest historic times. The best cymbals are those made in Turkey and China. The name is also applied to a musical instrument made of steel wire, in a triangular form.

CYME, a term employed in botany to designate those forms of inflorescence which are definite or centrifugal. See BOTANY, Vol. IV, p. 123.

CYNANCHUM, a genus of *Asclepiadaceæ*, of which some species have been used medicinally.

The Indian *Cynanchum extensum* yields fiber, and *Cynanchum ovalifolium*, a native of Penang, yields caoutchouc of excellent quality.

CYNOCEPHALUS, an African ape. See APE, Vol. II, p. 152.

CYNODON, a genus of grasses, having digitate or racemose spikes, so named from its sharp-pointed underground shoots. The most important species (*C. Dactylon*) is the widely distributed and well-known Bermuda grass. It is the principal fodder and pasture grass of India, where it is known by the names of *dhob*, *doorba*, etc.

CYNOGALE, an animal of the civet family. See MAMMALIA, Vol. XV, p. 436.

CYNOMORIUM, a genus of the curious parasitic family *Balanophoraceæ*. *C. coccineum*, a plant of a strange fungus-like appearance, is found in the islands of Malta and Gozo, parasitic upon the roots of *Salicornia*. It was long known as *fungus Melitensis*, and enjoyed the highest reputation as a styptic, besides being used as an astringent in dysentery and other maladies. These uses, however, depended on the doctrine of signatures alone, its scarlet color and blood-like juice being interpreted as providential indications of its curative destination for all injuries or diseases accompanied by bleeding.

CYNOSURE (literally, "the dog's tail"), the constellation of the Little Bear. As the pole-star is the principal star of the constellation, the eyes of mariners are frequently directed to it, hence the common application of the term *cynosure* to anything that strongly attracts attention; a center of attention.

CYNTHIANA, a city and capital of Harrison County, northern Kentucky, on the south fork of the Licking River, about 65 miles S. of Cincinnati. It has a college for women; its manufactories are principally flouring-mills and carriage factories; and it manufactures the famous "Bourbon" whisky. There is a fine race-course here. The place was named from Cynthia and Anna Harrison, daughters of an early settler. Three battles between the Union and Confederate forces were fought here; the first two were won by the Confederates under General Morgan, the last by the Union forces under General Burbridge, the dates being July 17, 1862; June 11, 1864, and June 14, 1864. Population 1890, 3,016.

CYPERACEÆ, the family of sedges, nearly akin to grasses, but easily distinguished by their solid, unjointed, generally triangular stems, undivided leaf-sheaths and absence of paleæ. There are between 2,000 and 3,000 species, widely distributed throughout all climates, but more especially in temperate and cold regions, and in marshy soils, of which they often take almost entire possession. Characteristic genera are *Cyperus* and *Scirpus*, while the largest genus, *Carex*, forms a highly specialized group.

CYPERUS, a large genus of sedges, sometimes called "galingales," and very widely distributed. It is characterized by its perfect flowers, flattened spicate or clustered spikelets, involucrate inflorescence and absence of bristles. *C. esculentus*, of the Mediterranean region, is somewhat cultivated for its nut-like sweet tubers, called "chufa." *C. phymatodes* and *C. rotundus*, variety *Hydra* ("nutgrass" or "coco-grass") are troublesome weeds of the southern United States, propagating by nut-like tubers, and very difficult to extirpate.

CYPRINIDÆ, a large family of fresh-water bony fishes, with open swim-bladders. Barbel, bream, carp, chub, dace, gold-fish, gudgeon, minnow, roach, and tench are familiar examples. They are distinguished by their small, toothless mouths, naked head, usually scaled body, and by the absence of the adipose fin. The family includes over a hundred genera, and eight times as many species. See ICHTHYOLOGY, Vol. XII, p. 692.

CYPRINODONTIDÆ ("toothed carp") a family of small bony fishes, with open swim-bladders. They are allied to carps (*Cyprinidæ*), but the mouth bears teeth, the head and body are scaled, and there are never barbules. The family includes twenty genera and over a hundred species, widely distributed in the warm and tropical zones, both fresh-water and marine.

CYPRIPEDIUM. See ORCHIDS, Vol. XVII, p. 818.

CYPRIS, a very common, small fresh-water crustacean, type of a family (*Cypridæ*) in the order *Ostracoda*. Like other ostracods, this small "water-flea" has an unsegmented body, seven pairs of appendages, a rudimentary abdomen and a bivalve mollusk shell inclosing all. The shell of cypris is dainty and elastic; the posterior antennæ bear a long tuft of bristles on their second joint; the second pair of maxillæ have a small gill appendage. See also CRUSTACEA, Vol. VI, p. 664.

CYPRUS, a large, historic island in the eastern part of the Mediterranean Sea. For its history down to 1875, geography and general description, see Vol. VI, pp. 747–750.

By virtue of a convention concluded between the representatives of England and the sultan of Turkey, in Constantinople, June 4, 1878, the island became a British colony. Under the same convention it became obligatory upon the inhabitants of the island to pay each year to the Sublime Porte a tribute of £92,800. There was extended to the people in 1882 the privilege of the election of their own representatives in a newly created legislature of limited power. In April of 1895 there began in the island, with apparent spontaneity, a vigorous movement for the abolition of the objectionable tribute to Turkey and for union with Greece.

Cyprus is politically divided into six districts, whose capital, Nicosia (q. v., in these Supplements), has a population of 13,000. The island is 3,854 square miles in extent, and has a total population of 225,000. Imports and exports alike amount to about £320,000 in their annual value. The coins of England and Turkey are current; the weights and measures of the latter nation are used. Cotton, wheat and barley remain the agricultural exports of chief importance, but the dwindling of the

once famous forests of Cyprus, now almost totally lost, has greatly impaired the fertility as well as the climate of the island. The numerous flocks of goats prevent the development of new vegetation by the destruction of all young shoots. The climate of Cyprus, though generally considered unhealthful, has proved beneficial to the English troops who are stationed there.

Copper, for which Cyprus was once famous, and which took its name from that of the island, has ceased to be an export of importance. An English corporation, which controls the Cyprian output of this mineral, operates only a few mines in the western portion of the island. Salt, once shipped, under the Turks, to a value of $40,000 per annum, is only produced for local consumption.

The highest official in the island is the High Commissioner, who is assisted by an executive council, and by a legislature of 18 members, three of whom are elected (for five years) by Mohammedan and nine by non-Mohammedan voters. An English judicial system is in vogue, and barrister judges preside over the courts. Half a regiment of infantry constitutes the English force of occupation, which is quartered at Polymedia, four miles north of Limassœ. Telegraphic communication with Europe has been established for many years.

Cyprus is a field of great interest and fertility for the archæologist. Here, in the ninth century, there was discovered the *Codex Cyprius*, in which is contained the oldest complete copy extant of the Holy Gospels. Late in the nineteenth century extensive and systematic excavations were begun in Cyprus by the British Museum. These were made in the vicinity of the ancient town of Curium, and there were unearthed many inscriptions and other relics, important in historical confirmation. It became evident, as stated by the historian Strabo, that the town Curium had originally been founded by a colony from Argos. There are contained in the Metropolitan Museum of Art, in New York City, Cyprian relics of great antiquity, which were unearthed by General Louis P. di Cesnola in 1870–75. These include pieces of statuary and like objects.

CYRIL OR CONSTANTINE, a missionary and apostle to the Slavs. See METHODIUS, Vol. XVI, p. 194.

CYRIL LUCARIS. See GREEK CHURCH, Vol. XI, p. 158.

CYSTICERCUS. See TAPEWORMS, Vol. XXIII, p. 52.

CYSTIDEA. See ECHINODERMATA, Vol. VII, p. 638.

CYTOLOGY. See EMBRYOLOGY, in these Supplements.

CYTOPLASM, a name applied to the general protoplasm of the cell, in which lie imbedded the other cell-structures, as nucleus, plastids, centrospheres, etc. It is a viscid substance, and as it is the chief seat of the nutritive processes, it must contain at different times all the substances which enter into the structure of the plant.

CZAR OR TSAR, a Slavonic word for prince, not related to Cæsar; a monarch of absolute authority; specifically, the title of the emperors of Russia. Ivan IV, "the Terrible," the first tsar of Russia, was crowned in Moscow in 1547. The empress of Russia is called the *tsaritsa* or *czarina;* the heir apparent, the *tsarevitch;* his wife, the *tsarevna.*

CZECH, SVATOPLUK, Czech poet, was born Feb. 21, 1846, at Ostredek, Bohemia. Having completed his studies at the gymnasium of Prague and in the university of the same city, he divided his time between occupation as an advocate and as the editor of various papers. In 1874 he traveled extensively in Russia, and many of his writings are based upon material gained in this journey. Noteworthy among his contributions to epic poetry are *Dreams; The Adamites; Slavia;* and *Europe.* His collected lyric poems have been published under the title *Narrations, Arabesques and Humoristic Subjects.* His epic poem, *Dagmar,* is thought to be unexcelled in contemporary Czech literature. As one of the editors of *Kvéty* and the *Lumir,* he has become prominent among Bohemians.

D

DAB—DAGOBERT I

DAB (*Platessa limanda*), a small, flat fish of the flounder family (*Pleuronectidæ*), common on the sandy coasts of Great Britain. One species has been found on the New England coast.

DACELO, a genus of kingfishers. The best-known species is the *Dacelo gigas* of New South Wales, commonly called the "laughing-jackass." The name was suggested by its harsh cry, uttered at early dawn. It inhabits hollow tree-trunks, and feeds upon fish, reptiles, etc.

DACITE, volcanic rocks chiefly occurring in Transylvania, Austria; the forms of greenstone-trachyte in which quartz is contained. The name was introduced in 1863 by the geologists, Von Hauer and Stache, who, in their study of the geology of Transylvania, found this formation frequent in the old Roman province of Dacia. Earlier than this, these rocks, whose composition and classification have been the cause of much dispute among geologists, had roughly been styled quartz-trachytes. Dacite is found in common occurrence with the precious metals of the Cordilleras and Andes of North and South America.

DA COSTA, Jacob M., an American physician; born in the island of St. Thomas, West Indies, Feb. 7, 1833. He acquired his classical education in Germany, and his medical training in Philadelphia, where he graduated at Jefferson College in 1852. He was appointed lecturer on clinical medicine in that institution, and in 1872 was chosen professor of the theory and practice of medicine. He has made a number of valuable contributions to medical literature, which include *Epithelial Tumors and Cancers of the Skin; Inhalation in the Treatment of Diseases of the Respiratory Passages;* and *The Physicians of the Last Century.* His specialty is diseases of the heart and lungs.

DACRES, Sir Sydney C., an English admiral; born at Totnes, Devonshire, England, Jan. 9, 1804. He entered the British navy at thirteen years of age; was lieutenant in the reduction of the Morea Castle in 1828; captain in the Crimean War, and commanded the first ironclad squadron. He was second in command in 1861, on the North American and West Indian station, when the *Trent* affair was pending between England and America. In 1868 he became senior Lord of the Admiralty, and retained this rank until 1872, when he was appointed governor at Greenwich Hospital. His retirement occurred in 1874, and he died in March, 1884.

DACRYDIUM, a genus of coniferous trees of the family *Taxaceæ*, chiefly natives of Tasmania and New Zealand. The Huon Pine (*D. Franklinii*) is valuable for its timber, which is excellent for spars. *D. taxifolium*, the Kakaterra tree of New Zealand, attains a height of two hundred feet, and is also valuable for timber. The fertile cone has usually but one to six bracts, which resemble the ordinary imbricate foliage leaves, in the axils of which there develops a single seed with a fleshy aril.

DACTYLOPTERUS. See Flying-fish, Vol. IX, p. 352.

DADAR, a town of Baluchistan, five miles S.E. of the Bolan Pass. It is said to be one of the hottest places in the world, although in latitude 30° N. The British troops here routed a Kelat force in November, 1840. The neighborhood produces grain, pulse, cotton, sugar, madder and fruits. Population, about 3,000.

DADEVILLE, a village and the capital of Tallapoosa County, central eastern Alabama, situated about 50 miles N.E. of Montgomery, on the Central Railroad of Georgia. It has a mineral spring and manufactories of buggies and wagons. Population 1890, 873.

DADO (It., a die), a term applied in architecture to the body of a pedestal, the cubic block between the base and cornice. It is also applied to a protection running around the bottom of the walls of a room, more commonly known as wainscoting.

DAET, a town of the island of Luzon, in the South China Sea, one of the Philippines. It is situated in the southern part of the island, on a river of the same name, and is the capital of the province of North Camarines. Population, 7,702.

DAGNAN-BOUVERET, Pascal Adolphe Jean, a French painter; born Jan. 7, 1852, in Paris. He studied at the École des Beaux Arts as a pupil of Gérôme, and in 1876 won a second *Grand Prix de Rome.* In the following year his work made its first appearance in the Salon, being represented by two mythological subjects, *Orpheus and the Bacchantes* and *Bacchus, Child.* M. Dagnan-Bouveret attained high rank in the contemporary French school, his mastery of technique and color being of the first order. Primarily a *genre* painter, his subjects are always in admirable taste. *The Parental Blessing*, in a Russian collection, and *The Conscripts*, in the state collections of France, are the most highly regarded of his later achievements. He was made an officer of the Legion of Honor, Dec. 31, 1891.

DAGO or DAGÖE, an island in the Baltic Sea, just south of the mouth of the Gulf of Finland, belonging to the Russian government of Esthonia. It is about 34 miles in length and 15 in breadth. The soil is sterile and the coasts rocky. The population, numbering about ten thousand, is chiefly Esthonian, employed in fishing and cattle-raising.

DAGOBERT I, a king of the Franks, a scion of the Merovingian family; born about 602. He was elected king of Austrasia in 622, and at the death

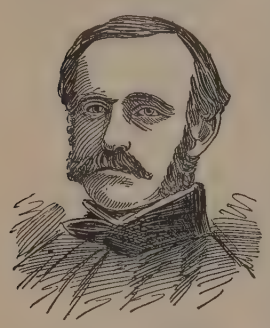
of his father, in 628, succeeded to the kingdom of Neustria, and to these added Aquitaine, after the death of his brother, Charibert, in 631. He thus became a ruler of the whole Frankish empire, and turned his attention to restricting the power of the feudal lords and prelates. One of his greatest feats was reducing the Frankish laws to a code. Before his death, which occurred in 638, he placed his sons Sigebert and Hlovis II, who were mere children, upon the thrones of Austrasia and Neustria, respectively. See FRANCE, Vol. IX, p. 530.

DAHLAK ARCHIPELAGO, a group of islands in the southern part of the Red Sea, lat. 16° N., long. 40° E., belonging to the Italian protectorate of Abyssinia. The largest is the coral island of Dahlak, 33 miles long and 15 wide. The chief industry of the inhabitants is pearl and coral fishing. The whole archipelago has an area of 420 square miles and a population of 2,000.

DAHLEN, a town of Germany in the Prussian Rhine province, about 26 miles E. of Leipsic. It has extensive manufactories of linen and silk. Population, 6,000.

DAHLGREN, FREDERIK AUGUST, a Swedish poet and critic; born in Nordmark, Sept. 20, 1816. He was graduated from the University of Upsala in 1839, and in 1871, having become well known as a historian, as a dramatic author, and as a poet, was elected to the Swedish Academy. He was associated with Chemnitz in the publication of *The Thirty Years' War*, a monumental work, and published several lesser historical works of his own. His *Vermländingarne*, a national opera, was brought out in 1846, and achieved great success. He also furnished for theatrical use translations into Swedish of many of the plays of Shakespeare.

DAHLGREN, JOHN ADOLPH, an American naval officer; born in Philadelphia, Nov. 13, 1809. His father, Bernard Ulric Dahlgren, was a merchant of Philadelphia, and for many years consul to Sweden. The son entered the navy in 1826, passed midshipman in 1832, and afterward served in the coast survey. In 1845 he was assigned to ordnance duty in Washington, and under his management the ordnance bureau acquired its present extensive works. The Dahlgren gun (q.v., in these Supplements), was perfected by him at about this time. He was made chief of the ordnance department in July, 1862, having, during the previous year, been in command of the United States navy-yard at Washington. At the beginning of the Civil War he had charge of the defenses at Washington on the left, and in 1863 was made rear-admiral and placed in command of the South Atlantic blockading squadron. He conducted naval operations in Charleston harbor, preventing blockade-running, and assisting in the destruction of Fort Sumter, and rendered important assistance to General Sherman in his military operations in South Carolina and Georgia. In 1866 he had command of the South Pacific squadron, and in 1868 again took charge of the bureau of ordnance in Washington. Admiral Dahlgren's works on ordnance have been used as textbooks by the government. He wrote treatises on *Boat Armament; Percussion System; Shells and Shell-Guns;* and *Maritime International Law*, which were printed after his death. He died in Washington, District of Columbia, July 12, 1870.



ADMIRAL DAHLGREN.

DAHLGREN GUN, a form of ordnance named for its inventor, Admiral Dahlgren of the United States navy. It was the result of a careful series of experiments on the construction of large guns. The chief improvement consisted in having relatively less metal in front of the trunnions, and more behind, where there is the greatest strain in firing. The 9-inch and 11-inch Dahlgrens are still the favorites of American seamen, and are unsurpassed by any ship-gun in the world.

DAHLONEGA, a village and the capital of Lumpkin County, central northern Georgia, on a tributary of the Chattahoochee. Before the war it contained a branch mint of the United States, and the building has been converted into the North Georgia Agricultural College. Gold-mines have been opened in one of the spurs of the Blue Ridge Mountains, north of the village. Population 1890, 896.

DAHN, JULIUS SOPHUS FELIX, a German publicist, historian and poet; born in Hamburg, Feb. 9, 1834; studied law, philosophy and history at Munich and Berlin; became professor extraordinary at Munich in 1862, professor ordinary at Würzburg in 1863, and in 1872 was appointed to the chair of German jurisprudence at Königsberg. Among his contributions to public law are the following: *Das Kriegsrecht* (1870); *Handelsrechtliche Vorträge* (1875); *Deutsches Rechtsbuch* (1877); and *Deutsches Privatrecht* (1878). Of his historical works the chief are *Prokopius von Cäsarea* (1865); *Die Könige der Germanen* (1861–71); *Westgötische Studien* (1874); and *Geschichte der Deutschen Urzeit* (1885). He has also written a series of popular historical romances, and lyrical and dramatic poems.

DAHOMEY. A complete account of Dahomey is contained in Vol. VI, pp. 764–767. Subsequent history alone need be added here. The kingdom of Dahomey, formerly the most powerful on the Slave Coast, Upper Guinea, has been greatly reduced in size and strength, especially by long and disastrous wars waged against Abeokuta and other petty Yoruba states on its eastern frontier. It now comprises an area of about four thousand square miles, with an estimated population of a little over one hundred and fifty thousand, and extends from Yoruba westward to the River Volta, separating it from Ashanti, and borders northward on the Wangera territory. It is entirely an inland state. According to the treaty of delim-

itation between British and French West African possessions, by convention of Aug. 10, 1889, Dahomey came within the sphere of France. Early in 1890 difficulties arose respecting the disputed stations of Porto Novo and Kotonu on the south coast, but after a brief series of hostilities peace was concluded in September, 1890, Dahomey recognizing the French claims to those places. Hostilities were resumed by the war-loving natives in 1893, and French troops under Colonel Dodds advanced from the coast to the capital, Abomey, which was captured in November, 1893, several disastrous battles having been fought during the campaign. King Behanzin surrendered unconditionally upon the 25th of January, 1894, and was succeeded in the same month by King Guthili.

There are annually exported from Dahomey 10,000 tons of palm-oil and 20,000 of palm kernels.

DAIMIO, the title of feudal lords of Japan. They were petty sovereigns, 264 in number. This old feudalism has been abolished, the daimios surrendering to the Mikado, in 1871, their lands and privileges, and he, in turn, granting them large pensions. See JAPAN, Vol. XIII, pp. 578–583.

DAINGERFIELD, a town and the capital of Morris County, northeastern Texas, situated 17 miles S.E. of Mount Pleasant, on the Rio Grande railroad. It is in a fine forest region, and has manufactures of chairs and other wooden articles. Population 1890, 553.

DAIR-EL-KAMAR, a town of Syria, the capital of the Druses, situated on the edge of a picturesque glen of Mount Lebanon. On the opposite side of the glen are the ruins of the palace Bteddin, formerly the residence of Emir Beshir, a ruler of Lebanon. It has a population of about eight thousand, chiefly engaged in the cultivation of mulberries, olives and vines.

DAIRY PRODUCTS, in the United States. See AGRICULTURE, and BUTTER, in these Supplements.

DAKOTA CITY, a town 16 miles N. of Fort Dodge, on the Blue Earth River, and on the Chicago and North-Western railroad; the capital of Humboldt County, northwestern central Iowa, Humboldt College is situated one mile north of the town. Population 1890, 353.

DAKOTA CITY, capital of Dakota County, northeastern Nebraska. It is located on the west bank of the Missouri, seven miles below Sioux City, Iowa, and on the Chicago, St. Paul, Minneapolis and Omaha railroad. Population 1890, 510.

DAKOTA FORMATION, a geological formation of the Cretaceous period, whose name is taken from the Dakota Indians, in whose territory it was first described. There are borne in this formation rich deposits of coal and of vegetable remains, indicating that the banks of the water-body depositing the formation were heavily timbered. Frequent shale and sandstone beds common throughout the Great Plains, especially in the western portion, and reappearing in the Colorado uplands, mark the outcrop of this formation. Reservoirs of artesian water occurring in the sandstones of this formation are the most important sources of deep-well supply in the Western states.

DAKOTA INDIANS. See SIOUX, in these Supplements.

DAKOTA RIVER (called by French explorers *Rivière à Jacques*) rises in eastern central North Dakota and flows south through South Dakota, emptying into the Missouri River about eight miles below Yankton. It traverses a region almost destitute of forests. Estimated length, 600 miles.

DALAMOW OR DALMOW, a city of India, on the Ganges, in the department of Oude. It is a reputed holy place, containing two antique temples of Siva. Population, 10,000.

DALBERGIA, a genus of trees and shrubs named in honor of the Swedish botanist, Nicholas Dalberg. They are of the family *Leguminosæ*, having pinnate leaves, and bearing a flat pod containing one to three seeds. All the species are natives of warm climates, and several of them are valuable timber trees, the *Dalbergia sissoo* of Bengal being especially prized. See also ROSEWOOD, Vol. XX, pp. 851, 852.

DALE, ROBERT WILLIAM, an English Congregational minister; born in London, Dec. 1, 1829. He was educated at Spring Hill College, Birmingham, and at the University of London. In 1859 he became pastor of the Congregational church at Carr's Lane, Birmingham, having since 1853 served as its associate pastor. For several years editor of *The Congregationalist*, he delivered the Congregational Union lectures in 1873, and took a prominent part in the movements of the churches of his denomination in England. Mr. Dale traveled in the Orient, and in 1877 visited America at the invitation of the theological faculty of Yale College to deliver the Lyman Beecher lectures on preaching. On his return to England he published, in *The Ninteenth Century*, his *Impressions of America*. He was a frequent contributor to the English reviews, and wrote numerous works, among which are *Week-Day Sermons; The Ten Commandments; Nine Lectures on Preaching;* and *Lectures on the Epistle to the Ephesians*. He was a man of exceptional strength and breadth of learning, famous as a writer upon popular subjects, as well as a pulpit orator. He died in London, March 13, 1895.

DALECARLIA, the län or county of Kopparberg, formerly a province of Sweden, lying in the south-central part of the kingdom. The Dalecarlians are celebrated for bravery and patriotism, especially for the part they took in freeing their country from the rule of Christian II of Denmark. As a reward, they are accorded special privileges by the king. The county is rich in mineral resources, especially in iron and copper, and is noted for its rugged and picturesque scenery. Area, 11,522 square miles; population, 201,674.

DALEVILLE, a village of Lauderdale County, central eastern Mississippi, of importance only as being the seat of Cooper-Huddleston College.

DALHOUSIE, a seaport town of northern New

Brunswick, situated at the mouth of the Restigouche River, and capital of Restigouche County. It has a fine harbor and docks. The chief industry is preserving salmon and lobster. Its exports are fish and lumber. The Intercolonial railway passes within four miles of the town. Population 1891, 2,532.

DALIAS, a town of southwestern Spain, in the province of Almeria, about 20 miles from the city of that name, and 4 miles from the Mediterranean Sea. It is poorly built and subject to earthquakes. It has lead-mines. The people are chiefly employed in mining, smelting and fishing. Population, 6,254.

DALKISSORE OR ROOPNA-RAYAN, a river of Bengal, rising in lat. 23° 30′ N., and long. 86° 34′ E. It has a southeasterly course of about 170 miles, emptying into the Hoogly River at Diamond Harbor. It is navigable for the greater portion of its course.

DALL, WILLIAM HEALEY, an American zoölogist and traveler; born in Boston, Massachusetts, Aug. 21, 1845. His mother, CAROLINE WELLS DALL, was prominent among the literary and critical woman writers of her time. Having attended the public schools of Boston, he became a pupil of the naturalist, Agassiz. He was appointed, in 1865, lieutenant in the international telegraph expedition, and from this time on was for many years connected with various explorations, traveling extensively in Siberia and Alaska. In 1884 he became palæontologist to the United States coast survey. He published numerous scientific papers on brachiopods and mollusks, and on the resources, meteorology and ethnology of Alaska, etc.

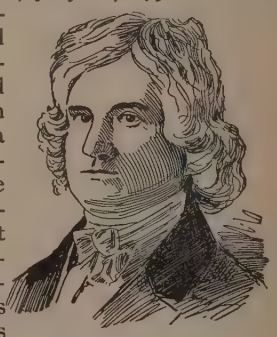
DALLAS, a town and the capital of Paulding County, northwestern Georgia, 33 miles N.W. of Atlanta; on the Pumpkinvine Creek, and on the Southern railroad. It was the scene of a battle between General Sherman and General Johnston, in May, 1864. Population 1890, 455.

DALLAS, a town and the capital of Polk County, northwestern Oregon, 15 miles W. of Salem, on the Rickreal River, and on the Southern Pacific railroad. It has an academy, woolen and flour mills, tannery, etc. Population 1890, 848.

DALLAS, a city of Texas, the metropolis of the northern portion of the state, capital of Dallas County, on the Trinity River, about one mile below the mouth of the West Fork. Although it was first settled in 1841, it has become one of the most important cities in the state. It is situated in the midst of a productive agricultural region, and has large grain-elevators and commercial warehouses. It is an important railroad center, being at the crossing of the Houston and Texas and the Texas and Pacific railways. It is abundantly supplied with good water, obtained from artesian wells; has gas-works, street-railways and electric-lighting systems. It has a university of the Christian Church, a college for women (Episcopal), a medical college, and excellent public and parochial schools. Its principal manufactures are flour, cottonseed-oil, agricultural implements, cement, artificial stone, wagons and carriages, and cotton and woolen goods. It also carries on an immense trade in cotton, grain, hides, etc. The Texas State Fair and Dallas Exposition buildings are located here, and cover eight acres of ground. It has many literary and benevolent institutions. Population 1880, 10,358; 1890, 38,067.

DALLAS, ALEXANDER JAMES, an American statesman and author; born in the island of Jamaica, June 21, 1759. He was the son of a Scotch physician; studied in Edinburgh and Westminster; read law in London, and then removed to Philadelphia, Pennsylvania, where he began the practice of law. In 1791 he became secretary of the commonwealth. He was editor of the *Columbian Magazine*, and also edited and annotated the laws of the state, and compiled *Reports of Cases* decided by the courts of the United States and Pennsylvania. In 1794 he was appointed paymaster-general, in 1796 secretary of state, and in 1814 President Jefferson appointed him United States district attorney for eastern Pennsylvania, which office he held until 1814, when he became Secretary of the Treasury under President Madison. In this capacity he rendered energetic and able service. In March of 1815 the duties of Secretary of War became also incumbent upon Mr. Dallas. These he continued to discharge until his retirement from public life in 1816. He died in Trenton, New Jersey, Jan. 14, 1817.

DALLAS, GEORGE MIFFLIN, an American statesman; born in Philadelphia, July 10, 1792. After graduation from Princeton College, he studied law with his father, Alexander James Dallas, and was admitted to the bar in 1813. He went to Russia as private secretary to Albert Gallatin, one of the commissioners to negotiate a treaty with Great Britain, through the Russian Emperor. On his return to the United States he devoted himself to his profession, and became solicitor of the United States Bank. In 1817 he was made deputy attorney-general of Philadelphia, and became mayor in 1828. This office he resigned to become United States district attorney. In 1831 he was sent to the United States Senate. In 1837–39 he was minister to Russia, and on his return again practiced law in Philadelphia. In 1844 he was elected Vice-President by the Democratic party, and in 1856 was made minister to England, where he displayed much tact in managing the Central American question. He returned to Philadelphia in 1861. Mr. Dallas wrote a *Series of Letters from London in the Years 1856–60* (1869). Died in Philadelphia, Dec. 31, 1864.



GEORGE M. DALLAS.

DALLES CITY OR "THE DALLES," capital of Wasco County, northern Oregon, located on the south bank of the Columbia River, and on the Oregon railroad, 90 miles E. of Portland. It was

founded in 1852. It has fine churches and excellent schools, including a Catholic academy. There is a branch mint and large woolen mills. Cattle, sheep and wool form its chief staples of industry. Population, about 4,500.

DALLES OF THE COLUMBIA, a name given to a portion of the Columbia River, near Dalles City, and 50 miles above the Cascades. For a considerable distance above, the stream is bounded by basaltic rocks, and at this point they suddenly confine it to about one third its usual width, with perpendicular walls on either side. The river plunges violently through the chasm, which is but 58 yards wide.

DALLES OF THE ST. LOUIS, a series of rapids in the St. Louis River, extending about four miles over a bed of slate, near Duluth, Minnesota. The river falls 400 feet in the four miles of rapids.

DALLINGER, William Henry, an English clergyman and naturalist, was born in 1841 at Davenport, England. At the age of 20 he entered the Wesleyan ministry, and for 12 years served in Liverpool. In 1888 he resigned the governorship of Wesley College, Sheffield, and devoted himself to his specialty, the study of minute forms of animal life. In 1866 he published *Minute Forms of Life;* in 1878, *The Origin of Life;* and in 1881, *Creator, and What we May Know of Creation.* The valuable results of Mr. Dallinger's investigations won him recognition throughout the scientific world, in which he held positions of high honor. As a minister he strove to demonstrate the harmony between Christian faith and scientific truth.

DALL' ONGARO, Francesco, an Italian writer and revolutionist; born at Odezzo, Italy, in 1808. He was a priest, but, being suspended for preaching independent doctrine, engaged in revolutionary journalism in Trieste, from which place he was expelled in 1847, and a year later was compelled to leave Italy altogether. On his return in 1859, he became professor of literature at Florence. He published lyric poems, tales and dramas. He died in Naples, Jan. 10, 1873.

DALRYMPLE, Alexander, a British geographer, hydrographer, a younger brother of Lord Hailes; was born at New Hailes, near Edinburgh, July 24, 1737. In 1752 he entered the East India Company's service, but having become interested in the commerce of the Eastern Archipelago, he resigned his office, and made a voyage of observation among these islands. In 1775 he was sent out to Madras as a member of council, and in 1779 was appointed hydrographer to the East India Company. In 1795 the Admiralty established a similar office and bestowed it on Dalrymple. This position he held until within a short time before death. He left a valuable library, which was purchased by the Admiralty. His writings included numerous important hydrographical works. He died June 19, 1808.

DALTON, a railroad junction and the capital of Whitfield County, northwestern Georgia, 39 miles N.E. of Rome, on the Southern and Western and Atlantic railroads. It is surrounded by extensive mineral fields of iron, limestone, manganese, etc.; manufactures cotton, iron and leather, and has, besides, a large trade in fruit and grain. Dalton Female College is located here. It was the headquarters of the Confederate army under Gen. J. E. Johnston in 1864, and several battles were fought in the vicinity prior to the Atlanta campaign. It was nearly destroyed during the war, but was rebuilt and is now a flourishing town. Population 1890, 3,046.

DALTON, a town of Berkshire County, northwestern Massachusetts, on the Boston and Albany railroad, five miles N.E. of Pittsfield. It has important manufactories of machinery, paper, woolens and cotton goods. Population 1890, 2,885.

DALTON, John Call, an American physiologist and physician; born in Chelmsford, Massachusetts, Feb. 2, 1825; graduated at Harvard in 1844. He became, successively, professor of physiology in the University of Buffalo, the Vermont Medical College and the New York College of Physicians and Surgeons. During the Civil War he was an army surgeon. He published a *Treatise on Human Physiology*, which passed through numerous editions; *Experimental Methods of Medicine; Topographical Anatomy of the Brain*; and other works. He died Feb. 12, 1889.

DALTON-IN-FURNESS, a town of northwestern England, Lancaster County, 18 miles N.W. of the city of Lancaster. The ruins of Furness Abbey, founded by Stephen in 1127, are near Dalton. On an islet fronting the town are the remains of an old castle, known as Peel of Foundey, originally built to defend the harbor. There are iron-works and iron-mines in the town. Population, 13,350.

DALTONISM or COLOR-BLINDNESS. See Dalton, John, Vol. VI, p. 784.

DALY, Augustin, an American dramatist and theatrical manager; born in Plymouth, N. C., July 20, 1838. He began his literary career by writing for the New York papers, and was dramatic editor of the *Courier*. His first decidedly successful literary work was *Leah, the Forsaken*, produced in 1862. *A Bachelor's Wardrobe*, previously written, had met with favor. His original dramatic works and his adaptations were numerous and clever. In 1879 he established Daly's Theater, in New York city, which became a center of Shakespearean productions, and of well-organized itinerant dramatic companies. Died in Paris, June 7, 1899.

DALY, César Denis, a French architect and publicist; born July 19, 1811, at Verdun, France. Early in his career he began architectural study under Jacques Félix Duban, the greatest French architect of his time. At about the same time he became one of the prominent contributors to the *Democratie Pacifique*, a daily journal whose advocacy of the social philosophy of Fourier, and whose staff of brilliant writers won for it great celebrity. M. Daly established, also, what became the foremost of architectural journals, *La Revue de l'Architecture et des Travaux Publics*. This he edited until his death. He visited America in 1855, traveling

extensively and making archæological and ethnological studies in the United States and in Central America. His most important work in construction was done from 1840 to 1845, during which time he had in charge the restoration of the cathedral of St. Cecilia, at Albi. The most considerable of M. Daly's professional writings is his monumental *Motifs Historiques d'Architecture et de Sculpture d'Ornement.* He died in Paris, in March, 1894.

DALY, Charles Patrick, an American jurist and historian; born in New York City, Oct. 31, 1816. He went to sea before the mast, but after a few years' service, returned to his native city, where he devoted himself to the study of law, and where, in 1839, he was admitted to the bar. Four years later he was elected to the legislature, became justice of the court of common pleas, judge and chief justice (1871–86). The writings of Justice Daly include *History of Naturalization and its Laws in Different Countries* and *Historical Sketch of the Judicial Tribunals of New York.*

DAM. See Water-supply, Vol. XXIV, pp. 406, 407.

DAMALA, Madame. See Bernhardt, Rosine, in these Supplements.

DAMANHUR, capital of the province of Bahreh, in Lower Egypt, five miles N. of Cairo. It has manufactories of wool and cotton. Population, 25,000.

DAMAR, a town of Yemen, southern Arabia, situated about 120 miles N.N.W. of Aden. It has a college, and is the residence of a governor. It contains about 5,000 houses.

DAMARA–LAND, a German protectorate in western South Africa, extending along the coast from the Kunene River to Walfish Bay, inland to long. 21° E. It forms the northern part of the German possessions in southwest Africa. The coast is bare and desolate, but inland are richer tracts. The country is occupied by the South-West African Company, an Anglo-German Syndicate, which obtained the right to search for and work the minerals of the district, outside the bounds of the German Southwest African Colonial Company, which holds the right principally for the coast-lands. The country is apparently rich in copper, and in agricultural resources, though as yet undeveloped. The area is 320,000 square miles; the population is estimated at 200,000, of which, in 1894, 12,000 were whites. See also Africa, in these Supplements.

DAMASTES of Sigeum, a Greek historian, about 440 B.C. Several works are ascribed to him, among which are genealogical histories of Trojan heroes, history of the Troad (q.v.), etc. The few remaining fragments of his works are collected in Müller's *Fragm. Histor. Græcæ.*

DAMBOOL or DAMBOLA, a village of Ceylon, remarkable for a vast rock temple of the Buddhists. It is on the south side of the rock Damboollagalla 550 feet high. Five-cave temples are cut into the side of this rock within one hundred feet of its top. In these caves one of the Cingalese kings found refuge from the savage attacks of the Malabars, at about 100 B.C. and in gratitude cut in the rock an enormous image of Buddha. Priests of Buddha have been in charge of this rocky cavern temple ever since. In one of the caves are curious inscriptions of Cingalese history of the twelfth century.

DAME'S VIOLET (*Hesperis*), a genus of plants of the family *Cruciferæ*, of which there are several species, natives chiefly of the middle and south of Europe. The common dame's violet, or white rocket (*H. matronalis*), is cultivated in gardens in the United States. The night-rocket (*H. tristis*) is a favorite flower in Germany.

DAMIEN, Father, a Belgian priest who, in 1873, went as a missionary among the lepers of the Hawaiian Islands, and on April 10, 1889, fell a victim to the dreadful disease of leprosy. He was born at Tremeloo, Belgium, in 1840. In 1860 he took holy orders. Having been sent on a mission to Honolulu, he learned of the leper colony and of their forlorn condition, and determined to devote his life to these unfortunates. There were nearly 800 lepers on the islands and Father Damien ministered to their wants, both physical and spiritual, until the end.

DAMM, Christian Tobias, a Greek scholar and theologian; born near Leipsic in 1699. He was rector of the Berlin gymnasium for twenty years (1744–64). His *Homeric and Pindaric Lexicon*, published in 1765, was his principal work. He also translated into German the Homeric poems. Died in 1778.

DAMMUDAH, a river of India, rising in Ramgarh, Bengal, about lat. 23° 55′ N., and long. 84° 53′ E.; pursues a southeasterly course of about 350 miles, and empties into the Hooghly from the right. The valley of the river is rich in deposits of iron and coal. The stream is navigable for light boats through most of its course.

DAMOPHON, a Greek sculptor of Messene, who flourished in the fourth century B.C. His works were chiefly statues of Parian marble and of wood. Among the most important are mentioned a statue of Lucina, one of the mother of the gods, of Mercury and of Venus. He was intrusted with the repair of the great masterpiece of Phidias, the ivory statue of the Olympian Zeus, which had become seriously damaged.

DAMPIER ARCHIPELAGO and STRAIT, named for the noted buccaneer and navigator William Dampier. The archipelago lies off the northwestern coast of Australia, at lat. 21° S., long. 117° E. They are not important or large; they belong to Western Australia. The strait is at the western end of Papua, or New Guinea, and separates it from Waigoe Island, lat. 0°, long. 131° W. It is 35 miles wide and 70 long.

DAMPS, in mining, the name given to the gaseous products eliminated in wells, coal-mines, etc. There are two kinds: *Choke-damp*, mainly composed of carbonic acid, and so called from its extinguishing flame and life; and *fire-damp*, consisting principally of light carburetted hydrogen, and so called from its tendency to explode when mixed with atmospheric air and brought into

contact with flame. See also COAL, Vol. VI, p. 72.

DAMSON, a variety of the common plum, which bears a rather small, oval fruit. There are many subvarieties bearing fruit of different colors—black, dark purple, yellow, bluish, etc. The name is a corruption of *Damascene*, meaning from Damascus. The Frogmore, Shropshire, and French damsons are of frequent occurrence in the United States.

DAMROSCH, LEOPOLD, composer, conductor and violinist; born Oct. 22, 1832, in Posen, Prussia. He took a degree in medicine at the University of Berlin, and practiced as a physician until 1854, not interrupting, however, his study of music. His career as a concert violinist began in 1855. He was successful from the beginning, the training which he had received from the masters Ries and Dehn, and great natural aptitude, uniting to make him one of the foremost exponents of the contemporary German school. In 1866 he became musical director of the theater of Breslau, and in 1871 leader of the Arion Society of New York City. Dr. Damrosch introduced German opera into the United States; its first appearance, in the Metropolitan Opera House, New York City, 1884, being a musical event of great moment. The great musical festival held under his management in 1881 was of scarcely less importance. The place of Dr. Damrosch as a conductor and as a concert violinist was doubtless in the front rank of his contemporaries. Up to the time of his death, which was sudden, he remained leader of the New York Oratorio and the Symphony societies, both of which he had founded. He died Feb. 15, 1885, in New York City.

DAMROSCH, WALTER JOHANNES, son of the foregoing; born in Breslau, Prussia, Jan. 30, 1862, and came with his father to the United States in 1871. In 1885 he succeeded his father as conductor of the Oratorio Society and assistant conductor of German opera at the Metropolitan Opera House, and won eminent success. He brought out Liszt's *Christus;* the whole of *Parsifal*, arranged for concert performance; Berlioz's *Damnation de Faust; Messe des Morts;* and *Te Deum;* and Grell's *Missa Solennis.* In 1890 he married Margaret Blaine, daughter of the late James G. Blaine. His grand opera, *The Scarlet Letter*, libretto by George P. Lathrop, after Hawthorne's romance, produced in Boston, Feb. 10, 1896, scored a great success.

DAMS, SUBMERGED. See IRRIGATION, in these Supplements.

DAN, a river of Virginia and North Carolina; rises in the Blue Ridge, Patrick Co., flows easterly, crossing the boundary between those states five times; meets the Staunton at Clarksville, Va., and with it forms the Roanoke. Length about 200 miles.

DANA, CHARLES ANDERSON, an American editor; born at Hinsdale, New Hampshire, Aug. 8, 1819. After two years of study at Harvard, he joined, in 1842, the Brook Farm community, at Roxbury, Massachusetts, where he remained until 1844. During the next three years he, in connection with George Ripley, Parke Godwin and John S. Dwight, edited the *Harbinger*, a weekly paper devoted to social reform and literature. He then became connected with the New York *Tribune*, and, after a few years, was one of its principal editors. From 1855 to 1863 Mr. Dana was engaged with George Ripley in the publication of the *New American Cyclopædia*, a work which won marked success.

CHARLES A. DANA.

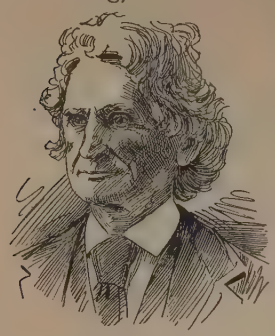
Mr. Dana's war editorials in the *Tribune* led to an estrangement with the editor, Horace Greeley, and in 1862 he severed his connections with that paper and entered the service of the government, officiating as assistant secretary of war from 1863 to 1864. On the return of peace, Mr. Dana became editor of the Chicago *Republican*, a daily which failed of success. In 1868 he organized a stock company that bought out the New York *Sun*, a daily newspaper, whose editor he became. Mr. Dana, the Nestor of American journalism, was trenchant and sarcastic; as a critic, able and opinionated; as a politician, bitter and erratic, with a constant eye to business. His ability and industry were unquestioned. Among his more important writings were *The Black Ant*, a translation, and *Life of Ulysses S. Grant* (Springfield, 1868), written jointly with Gen. J. H. Wilson. He also edited *The Household Book of Poetry*, first published in New York in 1857; in connection with Rossiter Johnson he compiled *Fifty Perfect Poems* (New York, 1883). Died in Glencove, L. I., Oct. 17, 1897.

DANA, EDWARD SALISBURY, an American mineralogist and physicist, the son of JAMES DWIGHT DANA (q.v., in these Supplements); born Nov. 16, 1849, in New Haven, Connecticut. He became, in 1879, assistant professor of natural philosophy at Yale, his *alma mater*. Since 1875 he has been one of the editors of the *American Journal of Science*. He is the author of *Text-Book of Mineralogy; Text-Book of Mechanics;* and edited the sixth edition of the *Mineralogy* of James Dwight Dana. In 1890 he was appointed professor of physics at Yale.

DANA, JAMES, an American divine; born at Cambridge, Massachusetts, May 11, 1735. He graduated at Harvard College and became a Congregational minister; was pastor of the First Church at New Haven, Connecticut, for 16 years. He was conspicuous for his independence and liberalism, and in his book, *Examination of Edwards on the Will*, he strongly opposed the rigid doctrine of that apostle of extreme Calvinism. He died in New Haven, Connecticut, Aug. 18, 1812.

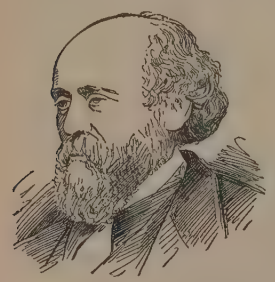
DANA, JAMES DWIGHT, an American mineralogist; born in Utica, New York, Feb. 12, 1813. He graduated from Yale in 1833, and was a teacher of mathematics at the United States Naval Academy for the two years immediately following, and during that time served

on an extended voyage in Mediterranean waters. Returning, he became assistant to Professor Silliman, of the department of chemistry at Yale. In December, 1836, Mr. Dana was appointed mineralogist and geologist to the United States exploring expedition under Commodore Wilkes, which he accompanied until its return in 1842. Work upon the material collected by him upon this expedition continued through several years, the results of his investigations finally appearing in *Reports on Zoöphytes* (1846); *Report on the Geology of the Pacific* (1849); and *Report on Crustacea* (1852). In 1837 there had appeared his famous *System of Mineralogy*, destined to pass through many revisions and additions, and to become for many years the standard authority upon its subject. In 1855 Mr. Dana became professor of natural history and geology in Yale College, a position which he held until his death. Among his more popular works are *Manual of Geology* (1862); *Text-Book of Geology* (1864); *Corals and Coral Islands* (1872); *Geological Story Briefly Told* (1875); *Characteristics of Volcanoes, with Facts from the Hawaiian Islands* (1890). Mr. Dana had wonderful capacity for research, and was one of the greatest of path-breaking scientists. He died in New Haven, April 14, 1895.



JAMES D. DANA.

DANA, Richard Henry, an American lawyer and author; born in Cambridge, Massachusetts, Aug. 1, 1815. He was the son of Richard Henry Dana (q.v., Vol. VI, p. 797), poet, and founder of the *North American Review*. The son entered Harvard, but, owing to impaired sight, was forced to abandon his studies, and shipped as a common sailor on the *Pilgrim*, bound to California, around Cape Horn. His experiences upon this voyage furnished the material for his famous book, *Two Years Before the Mast*. He again entered Harvard, where he graduated in 1837; studied law, and in 1840 was admitted to the bar of Massachusetts. In 1848 he took a prominent part in the convention at Buffalo which formed the Free Soil party, and in 1853 was a member of the Massachusetts constitutional convention. He was prominent in the Republican party from its foundation. In 1859–60 he made a voyage around the world, and on his return was appointed United States attorney for Massachusetts. At about this time he prepared, at the request of the heirs of Henry Wheaton, a revision of Wheaton's *International Law*. The new work came into high favor, and parts of it were translated by the United States government for the use of the arbitrators of the *Alabama* claims against Great Britain. In 1867–68 Mr. Dana was a member of the Massachusetts legislature, and in the latter year ran for Congress against General Butler, by whom he was defeated. In 1876 he was nominated minister to England by President Grant, but was not confirmed by the Senate, owing to the opposition of General Butler and to the controversy which he had had with W. B. Lawrence, who, in 1863, charged Mr. Dana with having infringed upon his copyright in his edition of Wheaton's *Elements of International Law*. This controversy continued through a number of years, and Mr. Dana was greatly injured thereby, although it was finally brought out that his transgression had been wholly unintentional. Mr. Dana also contributed extensively to the *North American Review*, wrote memoirs of Washington Allston and of Professor Edward Channing, and published *The Seaman's Friend*, a manual of the laws and customs of the sea. He died suddenly in Rome, Italy, Jan. 7, 1882, from pneumonia, while traveling in pursuit of his studies on international law.



RICHARD H. DANA.

DANBURY, a city of southwestern Connecticut, and one of the capitals of Fairfield County. Danbury is noted chiefly for its manufacture of hats, an industry which has flourished there for more than a century. It has manufactures of sewing-machines, boots and shoes, shirts, etc. There are also iron foundries, extensive waterworks, a town farm for the indigent, a cemetery of remarkable beauty, a high school, several graded schools, and a fine public library. The population of the city in 1880 was about 8,000; of the township, 11,666. In 1890 the population of the city was 16,552; including the town, 19,385. See Danbury, Vol. VI, p. 797.

DANCE OF DEATH, a certain class of allegorical representations illustrative of the universal power of death, and dating from the fourteenth century. The drama was constructed simply, consisting of short dialogues between Death, portrayed by a skeleton figure, and a number of followers. They were enacted originally in churches, and by religious orders. After a time an illustration was attached to each strophe, and these eventually became the chief point of interest. Being transferred from the quiet convent to more public places, they gave a new impulse to popular art, and series of scenes founded upon the Dance of Death are to be found treated in painting, sculpture and tapestry throughout Europe. The more ancient name was Dance Macabre, a word whose origin has given rise to a great amount of dispute among etymologists.

DANE, Nathan, an American lawyer; born at Ipswich, Massachusetts, Dec. 27, 1752. He served in the Continental Congress from 1785 to 1788, and framed the ordinance for the Northwest Territory, inserting a clause prohibiting slavery, and also one prohibiting the passage of laws for the impairment of contracts, a clause that later was

inserted in the United States constitution. He was United States Senator from 1794 to 1798, and he established the Dane professorship of law at Harvard, donating $15,000 for the purpose. He published a *Digest of American Law* in nine volumes. He died at Beverly, Mass., Feb. 15, 1835.

DANENHOWER, JOHN WILSON, an American Arctic explorer; born in Chicago, Illinois, Sept. 30, 1849. He graduated from the United States Naval Academy in 1870; served on the *Portsmouth* on a surveying expedition in the Northern Pacific; took part in subduing an insurrection at Honolulu, Hawaii, in 1873; served on board the *Vandalia* when General Grant visited Egypt, and in 1878 joined the *Jeannette*, which sailed from Havre, France, on an Arctic exploration. The expedition sailed through Bering Straits, and cruised in the Arctic Ocean until the steamer was crushed in the ice. The crew marched for 95 days over the ice, dragging their boats, and then embarked in the open waters, but a storm arose and separated the boats. Lieutenant Danenhower's boat reached the Lena delta, Sept. 17, 1881, but the other crews perished. With his crew he arrived in America in June, 1882. He published *The Narrative of the Jeannette* (1882). He died in Annapolis, Maryland, April 20, 1887.

DANIEL, JOHN WARWICK, an American public man and U. S. Senator from Virginia; born Sept. 5, 1842, at Lynchburg, Va.; received a thorough classical education and afterwards pursued legal studies at the Univ. of Va.; among the first volunteers he entered the Confederate service, May, 1861, and served during the Civil War in the Army of Northern Virginia, attaining the rank of major and adjutant-general on the staff of Gen. Jubal A. Early. He was a member of the Virginia house of delegates in 1869 and was elected to the State Senate in 1875 and 1879. In 1876 he was an elector-at-large on the Tilden and Hendricks ticket, and in 1881 resigned from the State Senate upon being nominated for governor by the wing of the democracy in favor of discharging the State's obligations. In the ensuing election he was defeated by the candidate of the opposing wing, Wm. E. Cameron. He was elected to Congress Nov. 4, 1884; on Dec. 15, 1885, was chosen as the successor of William Mahone in the U. S. Senate, and was, in 1891, re-elected to the same office.

JOHN WARWICK DANIEL.

DANIELL'S CELL. See ELECTRICITY, Vol. VIII., p. 93; and ELECTRICITY, §§ 99, 100, in these Supplements.

DANIELSON, a township of Windham County, northwestern Connecticut, situated on the Quinnebaug River, about 25 miles N. of Norwich. It contains a number of extensive cotton-mills and several shoe manufactories. Population 1890, 2,700.

DANITES, a secret organization among the Mormons, founded in 1838, whose members are believed to have been the authors of the Mountain Meadow massacre in 1857, and to have committed other atrocities. See MORMONS, Vol. XVI, p. 826.

DANKALI OR DANAKIL, a semi-independent state of Abyssinia, extending along the S.W. border of the Red Sea, included in the Italian colony of Eritrea. It is sterile and almost destitute of water. The heat is excessive, often reaching 110°F. The population, about 70,000, is Arabic and Mohammedan; the people are treacherous, indolent, and cruel.

DANNEWIRKE OR DANNEWERK, an ancient Danish wall of defense. See SCHLESWIG, Vol. XXI, p. 414. *The Dannewirke* is a favorite title for Danish newspapers.

D'ANNUNZIO, GABRIELE, Italian poet and novelist; born on the yacht *Irene* in the Adriatic, near Pescara, in 1864; educated at the College of Prato, Tuscany; went to Rome in 1880, but of late years has lived at Chieti. His works are brilliant, but realistic and sensual, and the later ones pessimistic. They include *Primo Vera* (1880); *Terra Vergine; Canto Novo* (1882); *Intermezzo dirime* (1883); *Il Libro delle Vergini* (1884); *San Pantoleone* (1886); *Isotheo; Chimera; Elegie Romana; Poema Paradisiaco; Il Piacere* (1889; in English, "*Pleasure*," 1898); *Marine Odes* (1893); *The Triumph of Death* (1894; English, 1896); *Maidens of the Crag* (1895); and *L'Innocente*.

DANSVILLE, a town of Livingston Co., N. Y., at the head of the Genessee valley; is an important railroad center, and has paper and pulp mills, a large pail factory, a seminary, and a hygienic institute. Population 1890, 3,758.

DANVERS, a town of Essex Co., Mass., 20 miles N. of Boston, on the Boston and Maine railroad; has large factories of shoes, iron, brick, carpets, and lumber, and a state insane asylum. Pop. 1890, 7,454.

DANVILLE, a city, the capital of Vermilion Co., Ill., an important railroad center on the Chicago, Danville and Vincennes, the Paris and Danville, the Wabash, the Indianapolis, Bloomington and Western, and the Evansville, Terre Haute and Chicago railroads; also on the Big Vermilion River; has various factories, also the car and machine shops of the Chicago, Danville and Vincennes railroad; and is engaged largely in the mining and shipment of coal, which crops out in abundant quantities from the bluffs in the immediate vicinity. Pop. 1880, 7,733; in 1890, 11,491; including suburbs, 17,768. See DANVILLE, Vol. VI, p. 820.

DANVILLE, a town, the capital of Hendricks Co., Ind., 19 miles W. of Indianapolis, on the Cleveland, Cincinnati, Chicago and St. Louis railroad; has flouring-mills, and factories of wooden articles. Population 1890, 1,569.

DANVILLE, a city, capital of Boyle Co., Ky., 100 miles S. E. of Louisville, on the Chattanooga and Lookout Mountain railroad; is the seat of Center College, the Southern Collegiate Institute, Danville Theological Seminary, Caldwell Female Institute, Morrison Female Seminary, Hogsett Academy, and a state asylum for the deaf and dumb; the center of a rich stock-raising

region, and is growing rapidly in importance and population. Population 1890, 3,766.

DANVILLE, a flourishing city of Pittsylvania County, southwestern Virginia, situated on the Dan River Falls, 65 miles S. of Lynchburg. It is a railroad center on the Richmond and Danville railroad, and the terminus of the Virginia Midland railroad. It is an important tobacco market, being in the center of the fine, yellow tobacco section. It is estimated that between 30,000,000 and 50,000,000 pounds of tobacco are sold at Danville annually. There are nearly 150 tobacco establishments and three cotton-mills in the city. It has superior educational advantages, and is the seat of the Danville Male Academy, the Danville Female Academy, and the Roanoke Female College. Population 1880, 8,726; in 1890, including North Danville, 14,104.

DAPHNE, a genus of shrubby plants of the family *Thymeleaceæ*, natives of Europe and Asia, characterized by its very tough bark, entire leaves, salverform or funnelform variously colored flowers in umbel-like lateral or terminal clusters, and brightly colored berries. *D. Mezereum* and *D. Cneorum*, both of Europe, and *D. odora*, the "sweet daphne" of China, are in common cultivation. The nearest American representative is the allied genus *Dirca*, known as "leatherwood" or "moose-wood."

DAPHNIA. See CRUSTACEA, Vol. VI., pp. 643, 663.

DA PONTE, LORENZO, dramatist and poet; born in Venice, Italy, March 10, 1749. He was of the Hebrew race and bore an assumed name. For several years he wrote plays and opera librettos in Vienna, among which were the texts of Mozart's *Don Giovanni* and *Nozze di Figaro*, both of which were made famous by the music. He was for a short time a secretary of Emperor Joseph II. In 1805 he settled in New York City, and in 1828 became professor of Italian at Columbia College. He wrote sonnets, made translations from English into Italian, and compiled several instruction books for acquiring his native language. Among his pub ications are his *Life* (3 vols., New York, 1823), and a *History of the Florentine Republic* (2 vols., 1833). He died in New York City, Aug. 17, 1838.

DARAGUNJ, an Indian town, in the Northwest Provinces, opposite Allahabad, and connected with it by a ferry. Here the bed of the Ganges is about one mile wide, and in the dry season two thirds of the width is covered with wet sand and mud, rendering the passage across it difficult.

DARBUNG, a mountain torrent of Bussaher, Hindustan. It rises in the Himalaya Mountains, 15,000 feet above sea-level, and, after flowing for 27 miles, is lost in the Sutlej, the most easterly of the five rivers of the Punjab. A wooden bridge about 33 feet in length crosses this river about 7 miles above its junction, with the Sutlej at a descent of 6,000 feet from its source, the banks of the river still farther up being bordered by several villages. Its source, which consists of fields of snow and ice half concealed beneath stones and rubbish, is described as a scene of terrific desolation.

DARBY, JOHN NELSON, an English theologian; and DARBYITES, a sect, his followers. See PLYMOUTH BRETHREN, Vol. XIX, pp. 238, 239.

DARBY CARBONIZING PROCESS. See IRON AND STEEL, in these Supplements.

DARCET, JEAN PIERRE JOSEPH, a French chemist; born in Paris, Aug. 31, 1777. His researches led to great improvement in the manufacture of gunpowder, and in the composition of bronze and of steel. M. Darcet also discovered a method of producing soda from common salt. His father, Jean Darcet, directed the manufacture of porcelain at Sèvres, and proved the combustibility of the diamond. He died in Paris, Aug. 2, 1844.

DARDANELLE, a town and one of the capitals of Yell County, northwestern central Arkansas, situated on the Arkansas River, about eighty miles above Little Rock. It is an important transportation point for cotton and other products, and contains a variety of manufactories. Population 1890, 1,456.

DAR FERTIT, the name given by the Arabs to a large tract of negro country in central Soudan, between lat. 6° and 10° N., and long. 24° and 27° E. This country has been the prey of Arab slave-hunters since 1820, and though rich in ivory, rubber, and many other resources, it is now nearly destitute of inhabitants.

DARFUR, STATE. See AFRICA, in these Supplements.

DARIC. See NUMISMATICS, Vol. XVII, p. 659.

DARIEN, a town of southeastern Georgia, capital of McIntosh County, and a port of entry, situated on the Altamaha River, about 60 miles S. of Savannah. It is an important shipping-point for the exportation of lumber. Population 1890, 1,491.

DARIEN SCHEME. See PATERSON, WILLIAM, Vol. XVIII, pp. 359, 360.

DARK AGES, the period between the fall of the Roman Empire and the revival of letters in the fifteenth century; or, according to some, dating from the invasion of France by Clovis in 486 to the invasion of Naples by Charles VIII in 1495, a period of about 1,000 years.

DARLEY, FELIX OCTAVIUS CARR, an American artist; born in Philadelphia, June 23, 1822. While a clerk in a mercantile house in Philadelphia, young Darley produced some humorous sketches which were praised so highly that he devoted himself to the pursuit of art by making drawings for engravers. His illustrations for books eventually became almost numberless; for the works of Fenimore Cooper he made more than five hundred drawings. Some of his sketches were reduced to appear on government bonds and bank-notes; he also produced many outline illustrations on stone. Among the latter are the series illustrating Irving's *Rip Van Winkle* and *Sleepy Hollow*. In 1852 he was made an academician of the New York Academy of Design. His exhibitions are nearly all in black and white. From 1864 until 1868 he resided in

Europe. After his return home he published *Sketches Abroad with Pen and Pencil* (New York, 1868); *Outlines to the Scarlet Letter* (1879); *Illustrations to Evangeline* (1883); and *Illustrations to Shakespeare's Plays* (1886). He died in Claymont, Delaware, March 27, 1888.

DARLING, a river of New South Wales, southwestern Australia, formed by the confluence of a number of rivers in the northern part of the colony, flows southwest for 600 miles and enters the Murray at about lat. 34° S., and long. 142° E.

DARLING, GRACE, an English heroine, daughter of the keeper of Longstone lighthouse, was born at Bamborough, England, Nov. 24, 1815. During a storm on the morning of Sept. 7, 1838, the *Forfarshire*, with 63 persons on board, was wrecked among the Farne Islands, and Darling, at the solicitation of his daughter, put off for the wreck, accompanied by her. Through their united efforts they reached and rescued nine persons. A purse of $3,500 was made up for her and her name became a household word. She died Oct. 20, 1842.

DARLINGTON, a town and the capital of Darlington County, northeastern South Carolina, 93 miles E.N.E. of Columbia, on the Atlantic coast line. It has a large trade in cotton, shipping annually twenty thousand bales, and also manufactures cotton goods. Population 1890, 2,389.

DARLINGTON, a city of southern Wisconsin, capital of Lafayette County, situated on the Pecatonica River, about 50 miles S.W. of Madison, and on the Chicago, Milwaukee and St. Paul railroad. It contains a number of manufactories, and is the center of an extensive trade in grain, live-stock, and butter and cheese. It has a calcic-magnesic spring celebrated for its medicinal virtues. In 1889 pearls were found in the Pecatonica River, near Darlington, and pearl-fishing has since been among the regular industries of the town. Population 1895, 1,811.

DARLINGTON, WILLIAM, an American politician and botanist; born in Birmingham, Pennsylvania, April 28, 1782; died in West Chester, April 23, 1863. He studied medicine, graduated from the University of Pennsylvania in 1804, and sailed for India as ship's surgeon. His *Letters from Calcutta* describe the trip. On his return to America he served two terms in Congress. He was a member of many learned societies of America and Europe. A remarkable pitcher-plant found in California was named *Darlingtonia* in his honor. His writings include *Flora Cestrica* and *Agricultural Botany*.

DARLINGTONIA, a genus of Californian plants of the family *Sarraceniaceæ*, being the Pacific coast representative of the Sarracenias, or pitcher-plants of the Atlantic region. The single species known (*D. Californica*) has the habit of the Sarracenias, growing in boggy ground, with a radical rosette of pitcher-like leaves, from the center of which rises the long scape bearing a single large nodding flower. The "pitchers" are the largest and among the most elaborate to be found in the family. The funnel-shaped tube rises with a spiral twist, becomes enlarged at the summit into the inflated over-arching dome which comes down over the rim of the pitcher, and terminates in a gaudily colored fish-tail appendage. Within the pitcher are numerous downwardly pointing hairs, to prevent the escape of the entrapped insects, and an accumulation of a sweetish liquid, in which they are drowned and macerated. Honey-like secretions upon the outside of the pitcher and upon the fish-tail appendage serve as a lure to the rim of the pitcher, within which a glazed zone usually insures a fall into the liquid, and the retrorse hairs prevent an escape. So far as known, the bodies thus obtained are macerated merely for absorption, and not subjected to the action of a digestive fluid, as in certain other carnivorous plants. The pitchers of *Darlingtonia* are two or three feet high, and form one of the most complete insect-traps known. See INSECTIVOROUS PLANTS, Vol. XIII, p. 138.

DARMESTETER, ARSÈNE, a French philologist and classical scholar; born in Paris, Jan. 5, 1846. Having undertaken studies anticipatory to the duties of a Jewish rabbi, he became deeply interested in philology, and determined to make that his life-work. His studies with Paris, the eminent French philologist, began in 1867. A few years later he had won the recognition of contemporary philologists, and had become a prominent authority upon the philology of the Romance languages. Solely to him is credit due for demonstration of the great importance of certain Old French glosses upon Hebrew words in determining the precise character of eleventh-century French. His dictionary of the French language, begun in association with M. Hatzfeld in 1871, is a monumental work of great value to philologists. In 1877 he published *Concerning the Actual Creation of New Words in the Freneh Language*, and, a year later, *View of French Literature in the Sixteenth Century*. At the time of his death, which occurred Nov. 7, 1888, he had but just reached what promised to be the most important period of his work.

DARMESTETER, JAMES, a French Orientalist; born March 28, 1849, at Château-Salins, in Alsace-Lorraine, now in Germany. He was educated at the Lycée Bonaparte in Paris, and shortly afterward undertook Oriental studies as a profession. In 1886, then a professor in the College of France, he went to India, and became connected with Bombay University. His first important work, *Harvatât and Ameretât*, an *Essay upon the Mythology of the Avesta*, was published in 1875. It was followed by *Ormazd and Ahriman: Their Origin and Their History; The Zend-Avesta; Oriental Essays;* and *The Prophets of Israel*. He died at Maisons-Lafitte, near Paris, Oct. 19, 1894.

DARNEL, the common name of *Lolium temulentum*, a pasture-grass introduced into the United States from Europe. It grows one or two feet high, with a loose spike of spikelets placed edgewise. It also is called "rye-grass" or "ray-grass," and, frequently being associated with wheat, its grains were supposed once to render the flour injurious.

DARTER. See SNAKE-BIRD, Vol. XXII, p. 188.

DARTER-FISH (*Etheostoma*), a bright-colored fish of the perch family, found in eastern North America. The name refers to the sudden movements of the fish when capturing its prey.

DARTMOOR, a granitic upland in Devonshire, England, the source, with two exceptions, of all the principal rivers of the county, remarkable alike for its wild and rugged scenery, its antiquities, its wide, solitary, trackless wastes, and its mineral products. To the brief notices found under DEVONSHIRE, Vol. VII, pp. 139, 140, the addition of more particulars of Dartmoor is desirable, visited as its rugged wilds are by tourists, and favorite subject as its bold scenery has been for the brush of many an artist.

The moor proper is upward of 130,000 acres, or 203 square miles, in extent, the extreme length from north to east being 25 miles, and the extreme breadth from east to west, 20 miles. The outline is irregular, and the surface has been well described as an extensive knob of granite covered by a peaty sponge. Its higher ranges are bleak and barren, but it has some pretty wooded valleys, through which run numerous streams, all well stocked with trout. The characteristic features of Dartmoor, however, and what give to it the chief interest, particularly for the antiquary and archæologist, are its many "tors," or huge blocks of granite, crowning the hills, its "maenhirs," its stone circles and its prehistoric villages, all walled around against wolves. Over the East Dart a rude cyclopean bridge still stands. Antiquaries attribute it to Celtic days, and its structure is such that the scythed chariots of Damnonian warriors might pass the river in safety. Near by is Crockern Tor, where the Stannary Parliament was wont to meet in the open air, until the middle of the last century. Kistvaens, or stone tombs of prehistoric days, are numerous, and Druidical circles are scattered over the moorland. In the most desolate part of the moor is Foxtor-mires, a treacherous morass, in which perished the only convict who has succeeded in escaping from the prison of Prince Town. This last was erected in 1808, at a cost of $635,000, as a place of confinement for prisoners of war. With peace, it was converted into a naphtha factory, but on the cessation of penal transportation it was reclaimed by government and employed as a convict station. Two strong walls inclose a circular area of about thirty acres, on which are built the prisons and offices. They are constructed of large blocks of stone, and radiate from a center. Four of the buildings (each 300 feet long and 50 feet wide) are used as prisons. Upward of 120 acres in the neighborhood are cultivated by the prisoners, and produce barley, oats, flax, carrots and mangold-wurzel.

A little to the west of Prince Town lie the enormous Dartmoor quarries, connected with Plymouth by the Plymouth and Dartmoor railway, and worked by convict labor from the neighboring prison.

The chief drawback to haphazard traveling over Dartmoor is the rough character of its upper parts. No one whose aim is enjoyment should attempt to cross by any but the beaten tracks, except in clear and dry weather.

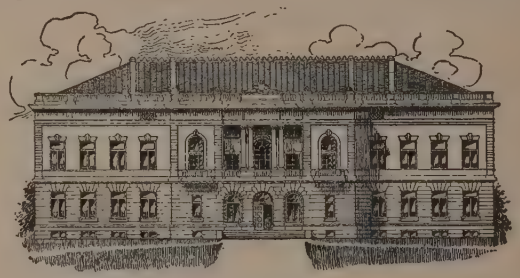
Tavistock, Lidford, with its fabled prototype of lynch law, whereof Browne, the Tavistock poet, wrote:

> I 've ofttimes heard of Lydford law,
> How in the morn they hang and draw,
> And sit in judgment after.

Moreton Hampstead, Bovey Tracey with a church full of quaint epitaphs of Anglican martyrs, Holne, Ashburton and Ivy Bridge are old-fashioned and curious towns around the moor, much frequented by tourists seeking picturesque repose. Dartmoor sheep are a small, hardy race, wild and restless, whose original home is in the forest and heathlands of Devonshire and Cornwall. In size they are small, their average weight on killing being about eleven pounds per quarter. Their mutton is highly esteemed for its flavor, and commands a ready sale. Their wool is soft and long, but of little bulk. They feed upon pasture too poor for the sustenance of other sheep, have white faces and legs, and when the ewes are crossed with Leicesters, heavy lambs are produced. A meteorological station is maintained on Lee Moor at an altitude of 860 feet above sea-level. The mean annual rainfall from 1866 to 1880 was seventy inches. The moor is often used for army maneuvers and artillery practice. Rowe's *Perambulation of Dartmoor* (1895) and Page's *Dartmoor* and *Rivers of Devon* (1895) contain valuable information.

DARTMOUTH, a town of Nova Scotia, connected by ferry with Halifax. It contains a number of manufactories, three tanneries, a provincial lunatic asylum and many handsome residences. Population, about 3,500.

DARTMOUTH COLLEGE, an institution of higher education at Hanover, New Hampshire.



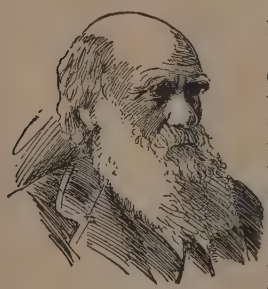
BUTTERFIELD MUSEUM, DARTMOUTH COLLEGE.

Its buildings stand upon the banks of the Connecticut River, amid beautiful surroundings. Save Harvard, Yale and Brown, Dartmouth is the oldest of the New England colleges. Moore's Indian Charity School, named for its benefactor, Joshua Moore, was established at Lebanon, Connecticut, Dec. 18, 1754, by Eleazer Wheelock, and out of it grew Dartmouth College. One Samson Occum, an Indian preacher who made a tour of England in 1865, was the means of arousing great interest in this school, and a sum of £10,000 was raised there for its benefit. At this time the first

board of trustees was elected, and the Earl of Dartmouth, who had taken keen interest in the enterprise, was chosen its president. The college was named in his honor. It was not, however, called a college until its removal, in 1865, into the township of Hanover, in the province of New Hampshire. The attendance was then about equally divided between Indian and English youths. The charter of the institution was given by Governor John Wentworth, in the name of King George III, Dec. 13, 1769. The college, whose early patrons were mostly in Great Britain, suffered keenly during the War of the Revolution, but it held its own and slowly regained prosperity. In 1816 the state legislature passed an act to change the name to "Dartmouth University," and to put the institution under state control. Out of this legislation grew the notable Dartmouth case, tried before the supreme court of the United States, and argued by Daniel Webster, who won the case for his *alma mater*. The old board of trustees was completely upheld in its maintenance of the sacredness of a private corporation, and its right to non-interference on the part of the state. The "university" was annulled and the former order of things resumed.

Dartmouth has become one of the foremost of institutions of higher education in the Eastern states, and is regarded as typical of the old-fashioned New England college. The religious tone is high, although the institution is non-sectarian. Associated with Dartmouth are the New Hampshire Medical School, the Chandler Scientific School, the Thayer Engineering School and the New Hampshire College of Agriculture and Mechanic Arts. There are 450 students in attendance. Women are not admitted. The presidency of the college has been held as follows: Eleazer Wheelock, 1769–79; John Wheelock, 1779–1815; Francis Brown, 1815–20; Daniel Dana, 1820–21; Bennett Tyler, 1821–28; Nathan Lord, 1828–63; Asa Dodge Smith, 1863–77; Samuel Colcord Bartlett, 1877–92; William Jewett Tucker, 1893.

DARWIN, CHARLES ROBERT, an English naturalist, the son of DR. ERASMUS DARWIN (q.v., Vol. VI, p. 830), was born at Shrewsbury, Feb. 12, 1809. He was educated at Edinburgh University, and at Christ's College, Cambridge. It was at the latter institution that his biological studies seriously began. On Dec. 27, 1831, shortly after taking his degree of B.A., he was appointed through the influence of Prof. J. S. Henslow of Cambridge, his instructor in botany, naturalist to the expedition of H.M.S. *Beagle* for a hydrographical survey of South American waters. He returned to England Oct. 2, 1836. It was during this long expedition that he obtained that intimate knowledge of the fauna, flora, and geological conditions of many tropical, subtropical and temperate climates which so admirably equipped him for the great work he was afterward to perform. On his return he formed the friendship of several scientific leaders, through whose influence he was appointed, in 1838, secretary of the Geological Society. In the next year he was elected to the Royal Society, and married his cousin, Miss Wedgewood. In the same year he published *Journal of Researches Into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle.* From 1840 to 1843 Darwin was occupied with the publication of the *Zoölogy of the Voyage of the Beagle.* In 1842 appeared his work on *The Structure and Distribution of Coral Reefs;* in 1844, *Geological Observations on Volcanic Islands;* and in 1846, *Geological Observations on South America.* These placed him at once in the front rank of contemporary scientific thinkers. Three years after his marriage, Darwin settled at Down, in Kent, where the remainder of his life was passed, private means enabling him to devote himself unremittingly to the pursuit of science. In 1858, Darwin set to work seriously to condense his vast mass of notes, and put into shape his great work, *The Origin of Species by Means of Natural Selection*, published in November, 1859. This book (see VARIATION, Vol. XXIV, pp. 77, 78), written in a style straightforward, and of charming simplicity, yet whose sensational theories represented the farthest reach of scientific knowledge, at once aroused a storm of controversy as no book of its kind has ever done. Its effect was widespread and profound. Darwin, meanwhile, calmly continued the work, in which he had shown the genius of patience and insight. In his subsequent publications he maintained, throughout a bitter theological and scientific warfare, the undisturbed serenity characteristic of the simple seeker after truth. No personal element finds place in his writings. The great series of works supplemental to *The Origin of Species* includes, besides his scarcely less famous *Descent of Man*, *The Fertilization of Orchids; Insectivorous Plants; Earthworms; Expression of Emotions in Man and Animals;* and *Cross and Self Fertilization in the Vegetable Kingdom.* It is as the great leader of evolutionary biology that Darwin will mainly be remembered. Though not himself the originator of the hypothesis, he was undoubtedly the first to gain for it acceptance among biological experts. He died April 19, 1882, and was buried with unusual honors in Westminster Abbey.



CHARLES DARWIN.

The article on TIDES, in this ENCYCLOPÆDIA, was written by Mr. Darwin's son, George.

DARWIN, FRANCIS, an English physiological botanist, younger son of Charles Robert Darwin, was born Aug. 16, 1848, at Down, Kent, England. He graduated from Trinity College, Cambridge, and received medical training at St. George's Hospital, London. In 1884 he became a university lecturer in botany, and, four years later, fellow of Christ's College, and reader in botany. He

was an assistant to his father from 1874 until the time of the latter's death. Mr. Darwin frequently contributed articles of importance upon physiological botany to scienific journals, and was the joint author of *The Power of Movement in Plants*, and, of Darwin and Acton's *Plant Physiology*. He was the editor of *Life and Letters of Charles Darwin*.

DARWIN, GEORGE HOWARD, an English scientist, the eldest son of Charles Robert Darwin, was born in 1845. He graduated from Trinity College in 1868, and in 1870 took part in the eclipse expedition to Sicily. He became a fellow of the Royal Society in 1879, and after that time his labors mainly were directed to investigation in physical astronomy. In 1882 he assisted in the revision of Thompson and Tait's *Natural Philosophy*. He became Plumian professor of astronomy and experimental philosophy at Cambridge in 1883. Besides numerous contributions to scientific journals, he has published *On the Influence of Geological Changes on the Earth's Axis of Rotation; On the Remote History of the Earth;* and *On Tides* (1898).

DARWINISM. See EVOLUTION, Vol. VIII, p. 769; and SOCIALISM, Vol. XXII, p. 219.

DASENT, SIR GEORGE WEBBE, an English author; born May 20, 1820, at St. Vincent, in the West Indies, of which island his father was attorney-general; was educated at Westminster School and King's College, London, and at Magdalen College, Oxford; called to the bar at the Middle Temple in 1852. An accomplished linguist, he acted frequently as examiner in English and modern languages for civil service appointments. In 1870–92 he was a civil service commissioner. In 1876 he was knighted for his services. He published a translation of *The Prose, or Younger Edda* (1842); *The Norseman in Iceland* (1858); *Popular Tales from the Norse* (1859); and *Tales from the Fjeld* (1874), both from the Norwegian of Asbjörnsen; translations from the Icelandic of the *Saga of Burnt Njal* (1861) and the *Story of Gisli, the Outlaw* (1866). His introduction to Asbjörnsen's *Popular Tales* is an admirable exposition of the Aryan theory of story transmission. His novels include *Annals of an Eventful Life; Three to One; Vikings of the Baltic;* and *Half a Life*. He died at Ascot, June 11, 1896.

DASYA, a genus of usually filamentous branching Red Algæ. Certain characteristic branches give rise to the *tetraspores*, or reproductive bodies. The species are numerous, brightly colored, and largely of tropical seas, but *D. elegans* is a common species of the Atlantic coast of the United States.

DASYPODIDÆ. See MAMMALIA, Vol. XV, pp, 386 et seq.

DASYURIDÆ. See MAMMALIA, Vol. XV, pp. 380, 381.

DATAMES, a Persian general who successfully quelled a confederate revolt, but, subsequently losing favor with Artaxerxes, himself revolted, was betrayed and assassinated, 362 B.C. See PERSIA, Vol. XVIII, p. 579.

DATE–PLUM, a name given to species of *Diospysos*, a genus of plants of the family *Ebenaceæ*. The trees are deciduous, with a globose berry, and grow in a warm or temperate climate. Some species produce ironwood, which is a hard timber, and the black heart-wood of others is ebony (q.v., Vol. VII, p. 619). The common date-plum, or pishamin, although a native of the coasts of the Caspian Sea, Mauritania, etc., is naturalized and cultivated in southern Europe, and also is called the European lotus and the date of Trebizond. It is a tree growing from 20 to 40 feet high, having shining oblong leaves; the small flowers are reddish white; the fruit, usually the size of a cherry, grows larger in favorable climates, and is then sweet and astringent, and yellow in color. When over-ripe it is eaten, like the medlar, or is used for conserves. One species (*D. Virginiana*), known as the persimmon, or Virginia date-plum, is found throughout the Atlantic and Mississippi valley states, and bears an edible fruit of a reddish color.

DATHOLITE. See MINERALOGY, Vol. XVI, p. 409.

DATIA, a town of central India, 18 miles by rail N. of Ihansi. It has a population of 30,000, and is inclosed by a stone wall 30 feet high.

DATISCACEÆ, a small family of plants, allied to *Begoniaceæ*, and consisting of herbs and trees, mostly found in the temperate regions of the northern hemisphere. *Datisca cannabina*, a plant much resembling hemp in its general appearance, a native of Crete, possesses very marked tonic properties. It contains, also, an amylaceous substance, called *datiscin*, resembling *inulin*, and affords a yellow dye.

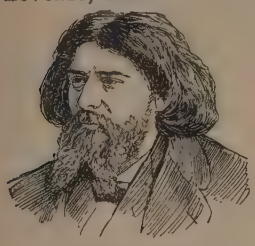
DATURA, a genus of plants of the family *Solanaceæ*, known as "thorn-apples," or "stramoniums," rank-scented, large-flowered, poisonous weeds, but some in cultivation for ornament. It is characterized by its prismatic calyx, large plaited funnelform corolla, often prickly, globular pods, and large flat seeds. *D. Stramonium*, the common thorn-apple or "Jamestown-weed" (corrupted into "jimson") with green stems and white flowers, and its associate, *D. Tatula*, with purple stem and flowers, are common weeds in waste places in the United States. *D. metel* and *D. meteloides*, and the tropical tree-like shrubs *D. arborea*, and *D. suaveolens*, are cultivated for ornament.

DAUBER, the name given to a mud-wasp, principally to the genus *Pelopæus*. It builds cells of clay, which are provisioned with insects and larvæ. Several species are common in the United States.

DAUBIGNY, CHARLES FRANÇOIS, a French landscape-painter; born in Paris, Feb. 15, 1817. As a young man he traveled and studied art in Italy, and in Paris was a pupil of Paul Delaroche. His first exhibition at the Salon was in 1838. His work at that time attracted little attention, and it was not until about 1857, in which year he won a first-class medal at the Salon, that he began to be recognized as among the foremost landscape-painters of the day. The conspicuous merit of his paintings lies in their fidelity to nature. Though rough in detail, they are, for massive handling, and withal just rendering,

unexcelled by the work of any contemporary artist. Among the noteworthy productions of Daubigny are *The Banks of the River Oulins; The Seine at Charenton; The Island of Bezons*—all the property of the French government; and *Springtime* and *A View in the Valley of Optevoz*, both in the Luxembourg. Several of his finest canvases are owned in the United States, where his works may often be seen at public exhibitions. He was made an officer of the Legion of Honor in 1874. He died in Paris, Feb. 19, 1878.

DAUDET, Alphonse, a French dramatist and novelist; born at Nîmes, May 13, 1840, and educated at the Lyons Lycée. In 1857 he went to Paris, where, in 1864, he became secretary to the Comte de Morny, president of the legislative corps. His literary efforts began with poetry, and his first book, *Les Amoureuses* (1858), immediately gained for him a reputation, and led to his employment on several newspapers. In *Figaro* appeared soon afterward *Les Gueux de Province*, in which he depicted with fidelity the miseries of the ushers in provincial schools. He devoted some not too successful years to theatrical work, writing, by himself or in collaboration, *La Dernière Idole* (1862); *L'Œillet Blanc* (1865); *Le Frère Aîné* (1868); *Le Sacrifice* (1869); *Lise Tavernier;* and *L'Arlésienne* (1872). Some of his best work appeared in journals, especially in *Figaro*, including *Lettres de Mon Moulin* (collected 1869); *Tartarin de Tarascon* (1872); the *Contes du Lundi* (1873); and *Robert Helmont* (1874). It was not till about 1874 that he adopted the style which made him famous. He sketched something of the kind in *Le Petit Chose* (1868), a story founded on his own childhood; and the publication of *Fromont Jeune et Risler Aîné* (1874) established his reputation. These were followed by *Jack*, the story of a workman (1876); *Le Nabab* (1877), a caricature of well-known personages under the empire; *Les Rois en Exil* (1879); *Numa Roumestan* (1882); *L'Évangéliste* (1883); *Sapho* (1884); *L'Immortel* (1888); *Souvenirs d'un Homme de Lettres* (1888); *Port-Tarascon* (1890); *Rose et Ninette* (1892); *La Petite Paroisse* (1895); and *Soutien de Famille* (1896). Died in Paris, Dec. 16, 1897.



ALPHONSE DAUDET.

DAUDET, Ernest, a French politician, publicist, and novelist, brother of Alphonse Daudet, was born at Nîmes, France, May 31, 1837, and removed to Paris in 1857. For a time, with his brother, in the employment of Comte de Morny, he became successively president of the Legislative Assembly, editorial secretary of the proceedings of the Assembly, and chief clerk of the Senate. While occupying these positions he was a constant contributor to various journals, and in 1873 was appointed director of the *Journal Officiel*. In 1877 he became editor of *L'Estafette*. He is author of numerous novels, of works on the political questions of the day, and some of his later works have dealt with matters of history. *L'Histoire des Conspirations Royalistes du Midi sous la Révolution* (1881) was crowned by the French Academy, and a prize was granted to the author on its account. He also wrote the following noteworthy novels: *Jean le Gueux; La Carmelite;* and *Henriette. Histoire de la Restauration* and *Les Bourbons et la Russie pendant la Révolution Française* are others of his important historical productions. He received the cross of the Legion of Honor in 1868.

DAUGHTERS OF THE AMERICAN REVOLUTION. See Colonial Societies, in these Supplements.

DAUGHTERS OF THE REVOLUTION. See Colonial Societies, in these Supplements.

DAUNOU, Pierre Claude François, a French historian and politician; born at Boulogne-sur-Mer, Aug. 18, 1761; died in Paris, June 20, 1840. He was a member of the convention of 1792–95, and opposed extreme measures; was, in 1795, first president of the Council of Five Hundred, and was one of the committee which drafted the constitution of the year 1800. *Cours d'Études Historiques* (20 vols.) is his most important work. In 1819 he became a member of the faculty of the College of France.

DAVENPORT, a flourishing city of eastern Iowa, and capital of Scott County, on the Chicago, Rock Island and Pacific railroad, and is the southern terminus of the Davenport and St. Paul railroad. It is connected with eastern cities by other railroads terminating on the opposite or eastern bank of the Mississippi River. The western terminus of the Hennepin canal, connecting the Mississippi River with the Great Lakes, is opposite Davenport. It has extensive manufactories of carriages, farming implements, woolen goods, cars, furniture, lumber, flour, etc., the census of 1890 showing 463 manufacturing establishments, having an aggregate capital of $8,283,078, and producing annually over $10,000,000 worth of finished products. It has numerous excellent schools, the Catholic Seminary of St. Charles Borromeo, a well-endowed Catholic hospital, and a large public library. It is also the seat of Griswold College (Protestant Episcopal), which was founded in 1859, and is the see of the Episcopal Church of Iowa. On the other side of the river, opposite the city, is Rock Island, a beautiful island several miles in length, owned by the United States government. Rock Island is the site of a United States arsenal and military headquarters, and is connected with Davenport by a notable wrought-iron bridge costing over a million dollars. Population of Davenport in 1890, 26,872; 1895, 30,010. See Davenport, Vol. VI, p. 836.

DAVENPORT, Edward Loomis, an American actor; born in Boston, Massachusetts, Nov. 15, 1814. He was a judicious and finished performer, equally good in tragedy and in comedy. His *début* was made in 1836 at Providence, Rhode Island, where he appeared as Parson Will in *A New Way to Pay Old Debts*, Junius Brutus Booth taking the *rôle* of Sir Giles Overreach. He

achieved success in Philadelphia, New York, Boston, and in England, becoming very popular in London. He married Fanny Elizabeth Vining, an English actress, in 1849. He died in Canton, Pennsylvania, Sept. 1, 1877.

DAVENPORT, Fanny Lily Gipsy, an American actress; born in London, April 10, 1850, daughter of Edward L. Davenport, the actor. Her parents brought her to America while she was a child, and she was educated in the Boston public schools, making her first appearance on the stage at the Howard Athenæum, in the play *Metamora*, in which she took the child's part. In 1862 she acted at Niblo's Garden, New York; subsequently at the Little Tremont Theater, in Boston, and in the Arch Street Theater, in Philadelphia. In 1869 Augustin Daly secured her services for his Fifth Avenue Theater, in New York, where she played in *London Assurance; As You Like It; Oliver Twist; School for Scandal; Divorce; Leah;* and *Pique.* In the last-mentioned her success was pronounced. Her starring tours were uniformly successful. She brought out Anna Dickinson's *American Girl* and Sardou's *Fédora*, *La Tosca*, *Cleopatra*, and *Gismonda.* In 1879 she married Edwin H. Price, but secured a divorce and married Melbourne McDowell. Died at Duxbury, Mass., Sept. 26, 1898.

FANNY DAVENPORT.

DAVENPORT, John, a Puritan preacher and pioneer, was born in Coventry, England, in 1597. He was educated at Oxford and ordained to the Anglican priesthood. He preached in London, and became famous for his learning and faithfulness to his duties. He was suspected of Puritan principles, and summoned before Archbishop Laud to answer the charges. About this time, his friend John Cotton having left the Established Church, Davenport was persuaded to do the same. He spent two years in pastoral work in Holland and then returned to England. In 1637 he sailed for Massachusetts, where he was welcomed cordially by the people of Boston. He afterward became one of the founders of the New Haven colony, one of the "seven pillars" of government, and was pastor of the First Church in Boston at the time of his death, which occurred March 15, 1670.

DAVID, a city of eastern Panama, Colombia, south of the Cordilleras de Chiriqui, 12 miles north of the Pacific coast. It is near the extinct volcano of Chiriqui, and in a rich alluvial plain. A large coal-field extends nearly across the isthmus at this point, and there are gold-mines in the vicinity. Population, 9,000.

DAVID CITY, the capital of Butler County, central eastern Nebraska, 63 miles W. of Omaha, and a railroad center of importance. It is on the Burlington and Missouri River, the Fremont, Elkhorn and Missouri Valley and the Union Pacific railroads. It is employed principally in the shipping of grain and stock raised in the neighborhood, but it also has manufactories of importance. Population 1890, 2,028.

DAVID I and DAVID II, kings of Scotland. See Scotland, Vol. XXI, pp. 482, 489.

DAVIDS, Thomas William Rhys, a British Orientalist; born at Colchester, May 12, 1843, and educated at the University of Breslau. He has held various appointments in Ceylon. His works include *Buddhism* (1878); a *Translation of the Fausböll Collection of Buddhist Birth-Stories* (1880); *Buddhist Suttas from the Páli* (1881); and *The Question of King Milanda* (1890). He is professor of Páli and Buddhist literature at University College, London.

DAVIDSON, George, an American scientist; born in Nottingham, England, May 9, 1825, of Scottish parents; removed to the United States in 1832; served as chief of the field assistants of the United States Coast and Geodetic Survey on the Pacific and Atlantic during the Civil War, and commanded the Alaska expedition to observe the total eclipse in 1869. In 1873 he determined the 120th meridian, and the year following conducted the United States transit-of-Venus party to Japan. From 1890 to 1893 he was in charge of trigonometrical stations on the Sierra Nevada and Coast ranges at altitudes of nearly thirteen thousand feet. A member of many scientific societies, he was made president of the California Academy of Sciences, and published many valuable works on transit observations, transit instruments, irrigation, and river and harbor improvements. He devised the new meridian instrument for latitude and time, bearing his name, as well as a break-circuit chronometer and other valuable instruments. He is the author of *The Coast Pilot of California, Oregon and Washington.*

DAVIDSON, John, a Scottish poet; born April 11, 1857, at Barhead, Renfrewshire, Scotland. He did not receive a systematic education, his youth being largely spent in the chemical department of a sugar-refinery. For several years he was a teacher in small Scottish towns, and in 1890 went to London, where he engaged in journalism and authorship. His best-known volume of verse is *Scaramouch in Naxos.* Others of his works are *A Random Itinerary; A Romantic Farce; An Unhistorical Pastoral; Fleet-Street Eclogues; Plays, Collected Edition; Godfrida* (a drama, 1898); and *The Last Ballad, and Other Poems* (1899).

DAVIDSON, Robert, Presbyterian clergyman; born at Carlisle, Pa., Feb. 23, 1808; graduated at Dickinson College in 1831, and Princeton Theological Seminary. He held pastorates at Lexington, Ky.; New Brunswick, N. J.; New York city; and Huntington, Long Island. For some time he was superintendent of public instruction in Lexington, Ky., and in 1840 became president of Transylvania University in that city. He was a commissioner of the American Board of Foreign Missions for 25 years; permanent clerk of the General Assembly from 1845 to 1850; delegate to the General Assembly of the Scottish Free Church

in 1869, and author of numerous writings, among which were *History of the Presbyterian Church in Kentucky; The Christ of God;* and *Elijah, a Sacred Drama.* He died in Philadelphia, April 6, 1876.

DAVIDSON, SAMUEL, a Biblical critic and liberal exegete; born at Kellswater, near Ballymena, Ireland, Sept. 23, 1807; was educated at the Royal College of Belfast; entered the Presbyterian ministry, and was called in 1835 to the chair of Biblical criticism at his *alma mater.* Becoming a Congregationalist, he was called in 1842 to the chair of Biblical literature and Oriental languages in the Congregational College at Manchester, a position which he was compelled to resign twenty years later, on the publication of the volume which he contributed to a new edition of Horne's *Introduction*, though his theological opinions are moderately conservative. The University of Halle conferred upon him a doctorate of theology, an exceptional honor. He was a member of the Old Testament Revision Committee. Among the best known of his works are *Biblical Criticism* (1852); *The Canon of the Bible* (1877); and *Critical and Exegetical Introductions both to the Old and New Testaments.*

DAVIDSON, THOMAS, an American naval constructor; born in Nottingham, England, Aug. 28, 1828. His parents moved to Philadelphia in 1832, and he was apprenticed to a ship-builder. In 1861 he was appointed quartermaster of the ship-carpenters in the Philadelphia navy-yard. He became commander in 1866, holding this office up to his death. During the Civil War he built the *Tuscarora* in 58 working-days, the *Miami* in 27 and the *Juanita* in 70 days. The last was his greatest achievement, as this was a ship of 1,240 tons and seven guns. Under his directions the *Monongahela*, which, by an earthquake, had been driven forty feet upon the beach at Santa Cruz, was safely moved lengthwise to the ocean and then over a coral reef 2,500 feet wide, when it once more floated in deep water. He died in Philadelphia, Feb. 18, 1874.

DAVIDSON, THOMAS, an English palæontologist; born in Edinburgh, May 17, 1817. His early education was obtained in his native city, and he afterward pursued scientific and artistic studies in France and Italy. Turning his attention to palæontology, his work in that department soon attracted the attention of the geological fraternity, and in 1858 he was chosen honorary secretary of the Geological Society of London, which awarded him, in 1865, the Wollaston gold medal. His scientific reputation depends chiefly upon his *British Fossil Brachiopoda*, (5 vols.). He died Oct. 16, 1885.

DAVIDSON, THOMAS, scholar and philosopher; born in the parish of Deer, Aberdeenshire, Scotland, Oct. 25, 1840; graduated at Aberdeen University and taught in various English schools. In 1866 he removed to London, Canada, and thence to the United States, where, in St. Louis, Missouri, he taught in the high schools. He became connected with the *Round Table* and the *Western Educational Monthly*, and in 1875 removed from St. Louis to Cambridge, Massachusetts. Many years of his life were spent in Italy, where he made a study of Catholicism, archæology, modern Greek and the scholastic philosophy of Rosmini and Dante. He published *The Fragments of Parmenides; On the Origin of Language; The Place of Art and Education; Handbook of Dante from the Italian of Scartazzini; Aristotle's Metaphysics;* and several other translations. Mr. Davidson frequently contributed philosophical and philological articles to various journals.

DAVIDSON, WILLIAM, a Revolutionary soldier; born in Lancaster County, Pennsylvania, in 1746. He served at the battles of Brandywine, Germantown and Monmouth; was made brigadier-general, and while on duty with 250 men to oppose the passage of the Catawba River, North Carolina, by Cornwallis, Feb. 1, 1781, was shot and killed. DAVIDSON COLLEGE (q.v., in these Supplements) was named in his honor.

DAVIDSON COLLEGE (named in honor of WILLIAM DAVIDSON (q.v., in these Supplements), a Presbyterian institution, founded, in 1837, at Davidson, Mecklenburg County, North Carolina. Having been endowed with $300,000 by Maxwell Chambers of Salisbury, North Carolina, it became one of the most important educational institutions in the state. It has over 700 alumni, an average attendance of 150 and a faculty of 10 members. Women are not admitted. President, the Rev. J. B. Shearer.

DAVIES, CHARLES, an American soldier and mathematician; born in Washington, Litchfield County, Connecticut, Jan. 22, 1798. He graduated from the Military Academy at West Point; served in New England garrisons and at West Point, where he resigned his commission and became professor of mathematics, and from 1839 to 1841 held the same position in Trinity College, Hartford, Connecticut. From 1841 to 1845 he was United States army paymaster. In 1848 he accepted the chair of mathematics and philosophy in the University of New York. He held the position for a year, taught in the Albany Normal School, and returned to New York, where he became professor of higher mathematics in Columbia College (1857–65). He devoted much time to the preparation of a series of books on mathematics, which were largely adopted in the academies. *Descriptive Geometry; Differential and Integral Calculus; Logic and Utility of Mathematics;* and *The Metric System*, were some of his best works. He died at Fishkill Landing, New York, Sept. 18, 1876.

DAVIES, HENRY EUGENE, JR., an American lawyer, son of Henry Eugene Davies; born in New York City, July 2, 1836. He was educated at Harvard, Williams and Columbia, graduated at the last-named college, and became a lawyer. He served throughout the Civil War, and rose to the rank of major-general of volunteers. From 1866 to 1869 he was public administrator of New York City, and from 1870 to 1872 assistant district attorney of the southern district of the state. He died at Middleboro, Massachusetts, Sept. 6, 1894.

DAVIES, JOHN LLEWELLYN, an English clergy-

man and author; born at Chichester, Feb. 26, 1826. He was educated at Repton School and at Trinity College, Cambridge, and in 1850 became a fellow of Trinity. Ordained in 1852, he was appointed incumbent of St. Mark's Church, London, and subsequently became rector of Christ Church. He was for some years principal of Queen's College, London, chaplain-in-ordinary to the Queen, and a frequent contributor to periodical literature. He published *Theology and Morality*, *Belief and Practice* (1873); *The Christian Calling* (1875); *Order and Growth in the Spiritual Constitution of Human Society* (1891); and *Spiritual Apprehension* (1898).

DAVIES, Sir Louis Henry, Canadian statesman; born in Charlottetown, Prince Edward Island, May 4, 1845. He received his education at Central Academy and Prince of Wales College, in his native town, and then fitted himself for the legal profession. A Liberal, he was twice chosen solicitor-general of his province, was opposition leader in the legislative assembly, and in 1876–79 premier and attorney-general. He was in the local legislature for most of the time from 1872 to 1879. In 1882–86 he represented Queen's County of his island in the Dominion Parliament, and was again re-elected in 1891. In the International Fishery Commission, which held its sessions at Halifax, Nova Scotia, in 1877, he was one of Great Britain's representatives. On July 13, 1896, he became Minister of Marine and Fisheries in the Laurier cabinet; and in July, 1898, he was made a member of the Canadian-American joint commission.

DAVIES, Samuel, an American clergyman, born near Summit Ridge, Del., Nov. 3, 1724. He was ordained in Hanover Co., Va., and some years later went to England and raised funds for the College of New Jersey, of which he was one of the founders, and whose president he became in 1759, succeeding Jonathan Edwards. He was prominent as a pulpit orator. A collection of his sermons was published in three volumes, after his death. Died in Princeton, N. J., Feb. 4, 1761.

DAVIES, Thomas Alfred, an American soldier, brother of Charles Davies, the mathematician, was born in St. Lawrence County, New York, in December, 1809. In 1829 he graduated from the United States Military Academy, and was assigned to service on the frontier. In 1831 he resigned his commission and served as one of the Croton Aqueduct engineers. When the Civil War broke out he entered the army as colonel of the Sixteenth New York, and was present at Bull Run, the defenses of Alexandria, and at the siege and battle of Corinth. From 1862 to 1865 he commanded various districts, and in the last-named year was brevetted major-general of volunteers. He has published several works on theological subjects, among which are *Cosmogony, or Mysteries of the Creation; Adam and Ha-Adam;* and *Genesis Disclosed.*

DAVIESS, Joseph Hamilton, an American lawyer, pioneer and soldier; born in Bedford County, Virginia, March 4, 1774. He studied for the legal profession, and attained considerable fame as a lawyer and patriot. He became United States attorney for Kentucky, and his most notable act in that capacity was the bringing of charges against Aaron Burr for "levying war against a nation with which the United States was at peace." Witnesses against Burr failed to appear, and thus the charges were not sustained. Several counties, in different states, have been named for him. He was killed in the battle of Tippecanoe, Nov. 7, 1811.

DAVIN, Nicholas Flood, poet and publicist; born Jan. 13, 1843, at Kilfinane, Ireland. He graduated from Queen's College, Cork, and in 1868 was admitted to the English bar. He was appointed war correspondent for the London *Standard* during the Franco-Prussian war, and in 1879 was commissioned by the Canadian government to visit the United States for the purpose of investigating the Indian industrial schools. Various other official positions were held by him prior to his election in 1887 and 1891 to the Dominion Parliament. His published works include *Eros, an Epic of the Dawn, and Other Poems; The Irishman in Canada;* and *Ireland and the Empire.*

DAVIS, Andrew Jackson, an American spiritualist and author; born in Orange County, New York, Aug. 11, 1826. In his youth he lived in great poverty, and obtained little education, but developed great clairvoyant powers, and is reported to have fallen into trances frequently, in which he claimed that he spoke with spiritual beings, and received instruction concerning the future state. In a supposed trance he dictated to the Rev. William Fishbough his first book, on *The Principles of Nature.* He lectured and wrote many books in the interests of spiritualism. Among his publications are *The Great Harmonia* (6 vols., 1861); *Philosophy of Spiritual Intercourse* (1870); *The World's True Redeemer* (1863); *Principles of Nature;* etc.

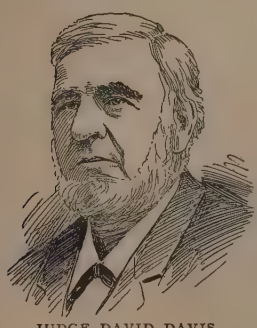
DAVIS, Charles H., an American landscape-painter; born Jan. 7, 1856, at Amesbury, Massachusetts. His earlier artistic training was obtained under Grundman in Boston; afterward he became a pupil of Lefèbvre and Boulanger in Paris. A painting of his, hung in the Paris Salon of 1887, received honorable mention, and succeeding work won him an enviable reputation among landscape-painters. For a number of years he painted in Normandy, where some of his finest productions, exquisite in color and of remarkable faithfulness, were produced. In 1887 Mr. Davis won the $2,000 prize of the American Art Association. The Union League Club of New York City possesses one of his most noteworthy achievements, *Late Afternoon.*

DAVIS, Charles Henry, an American naval officer; born in Boston, Massachusetts, Jan. 16, 1807; died at Norfolk, Virginia, Feb. 18, 1877. He entered the navy in 1823, served first in the Pacific and then in the Mediterranean squadron; was engaged subsequently in coast duty (1842–56), and while surveying in the vicinity of Nantucket, located several hitherto undiscovered shoals in the track of ocean steamers sailing between Europe and New York, which accounted for many unexplained accidents in the same vicinity. In

1861 he became a member of a board to inquire into the condition of the Southern coast harbors and defenses. The investigations resulted in a decision to send an expedition against Port Royal. He was made flag-officer of the Mississippi squadron, and, joining Admiral Farragut, engaged in the Vicksburg operations, and led an expedition up to Yazoo River. He was commissioned commodore in 1862, in 1863 was made rear-admiral, and from 1867 to 1869 was commander of the South Atlantic squadron. Later he was appointed commander of the United States navy-yard at Norfolk. Admiral Davis was a member of several scientific societies, and was a writer on mathematical, astronomical and geodetic subjects, his best known books being *Memoir upon the Geological Action of Tidal and Other Currents of the Ocean* and *The Law of Deposit of the Flood Tide.*

DAVIS, Cushman Kellogg, an American politician; was born June 16, 1838, at Henderson, Jefferson County, New York, where he received a common school education. After graduation from the University of Michigan in 1857, he undertook legal studies, which were interrupted by the Civil War, during which he served as first lieutenant in the Twenty-eighth Wisconsin Infantry. In 1867 he was elected to the Minnesota legislature, and in the following year became United States district attorney for Minnesota. He was elected governor of Minnesota in 1874, and took his seat as a Republican member of the United States Senate, March 4, 1887, and was re-elected in 1893.

DAVIS, David, an American statesman and jurist; born in Cecil County, Maryland, March 9, 1815. He graduated from Kenyon College, Gambier, Ohio; studied law in Massachusetts and at New Haven, Connecticut, and began practice in Bloomington, Illinois. He sat in the legislature in 1844, and three times was elected judge of the eighth judicial circuit of the state, but resigned this position in 1862. President Lincoln, whose intimate friend he was, appointed him a justice of the United States supreme court, and he was executor of Lincoln's estate. In 1872 Judge Davis was nominated for the Presidency by the Labor Reform party. He left the supreme bench in 1877 to take a seat in the United States Senate, having been elected to succeed John A. Logan. After the death of President Garfield he was chosen, Oct. 13, 1881, president of the Senate. He resigned his seat, March 3, 1883. Judge Davis was an Independent, but usually voted in Congress with the Democrats. He died at his home in Bloomington, Illinois, June 26, 1886.



JUDGE DAVID DAVIS.

DAVIS, Edwin Hamilton, an American physician and archæologist; born in Ross County, Ohio, Jan 22, 1811; was educated for the medical profession, and became professor of *materia medica* and therapeutics in New York College. He was best known for his interest in American antiquities, his exploration of Indian mounds, and his collections of mound relics, having gathered one of the largest collections of mound relics in America. This collection now forms part of Blackmore's Museum, Salisbury, England. A duplicate collection is in the American Museum of Natural History, New York. He wrote *Ancient Monuments of the Mississippi Valley*, which was the first volume published by the Smithsonian Institution. He died in New York City, May 15, 1888.

DAVIS, Garret, an American lawyer and statesman; born at Mount Sterling, Kentucky, Sept. 10, 1801; received a classical education; was admitted to the bar in 1823; elected to the state legislature in 1833; in 1839 was a member of the state constitutional convention, and in the same year was elected to Congress, serving till 1847. At the commencement of the Civil War he exerted himself to prevent the secession of his native state, and was elected to the United States Senate to succeed John C. Breckenridge. He served in the Senate till his death, which occurred Sept. 22, 1872.

DAVIS, George R., an American public man; born in Palmer, Massachusetts, in 1840; enlisted in the Eighth Massachusetts Infantry in 1861; recruited a battery in 1863, and rose to the rank of colonel, continuing with the army, in the civil department, until 1871, when he resigned and settled in Chicago. Taking a prominent part in politics as a Republican, he served three terms in Congress (1878–84), and one term as treasurer of Cook County (1886–90). He was prominent in the work of securing the World's Columbian Exposition for Chicago; was chosen a director of the local board, and in September, 1890, director-general of the exposition.

DAVIS, Henry Winter, an American statesman; born in Annapolis, Maryland, Aug. 16, 1817. After graduation in 1837 from Kenyon College, Ohio, he undertook study of the law at the University of Virginia, and practiced in that state from 1841 to 1850. Surrounded by and associating with slaves, his advocacy of their emancipation was determined largely by what he early learned of their condition. He gained reputation as an orator, and in 1854 was elected to Congress, where he served for three consecutive terms. On the dissolution of the Whig party he became a radical Republican. In 1860, when Mr. Lincoln was nominated for President, the Vice-Presidency was offered to Mr. Davis, but he declined the honor, and later refused to accept any Cabinet position. From 1863 to 1865 he was again in Congress, and served as chairman of the Committee on Foreign Affairs. He favored the enlistment of negroes and the extension of the right of suffrage to them. A day was set apart by Congress, at his death, for the commemoration of his public services—an honor never before paid to an ex-Congressman. His public speeches were collected, and, with a sketch of his life, were pub-

lished in 1867. He died in Baltimore, Dec. 30, 1865.

DAVIS, JEFFERSON, President of the Confederate States of America; born June 3, 1808, in Christian (now Todd) County, southwestern Kentucky. He became a student at Transylvania College, Kentucky, and in 1824 a cadet at West Point, having been appointed by President Monroe. For seven years after his graduation from the Military Academy he held the commission of lieutenant, and was assigned to frontier duty. During this time he served in the Black Hawk war. Having married the daughter of General Taylor shortly after his resignation from the military service in 1835, he settled as a cotton-planter near Vicksburg, Mississippi. His political prominence dates from his election, upon the Democratic ticket, in 1844, to membership in the electoral college, which was to ballot on Polk and Dallas for the Presidency. A year later he became the Representative of his district in Congress, and in 1846, upon the outbreak of the Mexican War, was chosen the colonel of a Mississippi regiment of volunteers. He promptly resigned his seat, and led his regiment to join the army of General Taylor in the valley of the Rio Grande. Having rendered gallant service in the battles of Monterey and Buena Vista, being severely wounded in the latter, he was offered by President Polk a brigadier-generalship. This he declined, on the ground that a "military appointment by a Federal executive is unconstitutional." In accord with the theories to maintenance of which he devoted his life, he, in this case, avowed it to be the right of the state alone to issue commissions in the volunteer service. The war over, Jefferson Davis returned to his home, and he was appointed at once, by Governor Brown, to fill a vacancy in the United States Senate. This appointment received the confirmation of the legislature early in 1848, and in 1850 he was returned for a full term. While he was in the Senate he held the office of chairman of the Committee on Military Affairs, and in debate was known as the champion of domestic and states' rights. Nothing in his Senatorial career is indicative of overt ill faith toward the maintenance of the Union, although his doctrine of the sovereignty of the state, and its right of withdrawal from a voluntary compact—the constitution—ultimately meant, in view of the attitude of the government toward the institution of slavery, advocacy of secession. With his leader, Calhoun, he held for constitutional obligation upon the government to respect and protect the property right of slavery, because it existed prior to the constitution. Resigning his seat in the Senate in 1851, he devoted himself to campaign work in Mississippi, having been nominated for the governorship upon the Democratic ticket. He was the defeated nominee in a close election. In 1852 he assisted in the election of Franklin Pierce, by whom he was appointed Secretary of War, in which capacity he introduced in the army the Minié rifle, iron gun-carriages and other improvements. In 1857 he re-entered the Senate, becoming the Democratic leader of the Thirty-sixth Congress. Here he opposed the French spoliation bill and the "popular sovereignty" doctrine, but favored the passage of the Kansas conference bill. It is noteworthy that in a speech in 1860 he discriminated between independence, which had been dearly bought, and the Union, which had cost "little time, little money, and no blood." Later, being appointed on the Senate committee to examine into the condition of the country, he reluctantly consented to serve, and made an address, in which he affirmed his willingness to do anything to avert the impending struggle. When Mississippi seceded from the Union, Jan. 9, 1861, Mr. Davis resigned his seat, and at once assumed command of the military forces of his state. On Feb. 18, 1861, he was elected President of the Confederate States by the provisional Confederate convention in session at Montgomery, Alabama. He formed his Cabinet, and in his first message to the provisional Confederate Congress commended the attack on Fort Sumter, and characterized President Lincoln's action in calling for volunteers as unconstitutional and absurd, saying, "All we ask is to be let alone."

JEFFERSON DAVIS.

The history of the Presidency of Jefferson Davis is, from the Confederate standpoint, the history of the war. Its beginning was the beginning of warlike preparations for the defense of the Confederacy, signalized by the bombardment of Fort Sumter; its end, the end of Southern resistance to the Union.

On Feb. 22, 1862, Mr. Davis was re-elected President for a term of six years. Soon after the defeats at Vicksburg and Gettysburg, trouble arose in the Cabinet, hitherto submissive to the will of the executive. The Secretary of the Treasury resigned, and financial ruin threatened the Confederacy.

The year 1864 opened favorably for the Southern army, but by the middle of July the tide had turned. The Southern peace party was gaining in numbers, and Mr. Davis sent three commissioners to treat for peace with the United States. The meeting took place on a steamer in Hampton Roads, but no good resulted. On the return and report of the commissioners, meetings were held and attempts made to revive popular enthusiasm, but Sherman had gained the sea, Grant was drawing his lines closer about Richmond, and Mr. Lincoln was re-elected President. The Confederate Congress began to grow uneasy and to show lack of confidence in the administration, and the Secretary of War resigned his portfolio.

Mr. Davis's last message was dated March 13, 1865, and in it he confessed the gravity of the sit-

uation, yet asserted, that there were ample means for bringing things to a successful termination. Twenty days later he left Richmond, and on April 9, 1865, Lee surrendered to Grant. Mr. Davis went to Danville, then to Greensboro, North Carolina, where he conferred with Generals Johnston and Beauregard; thence to Charlotte. At Irwinsville, Georgia, May 10th, he was captured by a company of Union soldiers under Lieutenant-Colonel Pritchard, while attempting to escape arrest. He was taken to Fortress Monroe and confined for two years, while the authorities at Washington were deciding what should be done with him. He was indicted for treason in 1866. On May 13, 1867, Mr. Davis was brought into court at Richmond and admitted to bail. He was never brought to trial, but was included in the general amnesty declared in December, 1868, although he steadfastly refused to take the necessary steps to have his political disabilities removed.

After regaining his freedom, Mr. Davis was received enthusiastically in the South. In a speech made in the summer of 1871, he declared himself still in favor of states' rights, and affirmed that he did not "accept the situation."

Jefferson Davis was a man of marked inflexibility, of thorough conviction, of exceptional executive ability, and of extreme pride. Scornful of the methods of the average contemporary politician, he was fearlessly frank, and a speaker whose utterances never failed of clearness, nor lacked in power. At no time did he retreat from the attitude maintained by him throughout, nor did apology ever escape him. His attitude of irreconciliation to the Union was maintained until the end. Of more than average height, gaunt in feature and erect in stature, his personal appearance was not impressive. For many years he was an intense sufferer from neuralgia, but did not permit his physical condition to interfere with his official duties. During his retirement at Beauvoir, Mississippi, where the last twenty years of his life were spent, he wrote *The Rise and Fall of the Confederate Government*, a work which aroused much adverse comment from those military officers of the Confederacy with whom his relations had not always been amicable. He died Dec. 6, 1889.

DAVIS, Jefferson C., an American soldier; born in Clarke County, Indiana, March 2, 1828. He served during the Mexican War, in the Indiana regiment, under Colonel Lane, and was made a second lieutenant of artillery for gallant conduct in the battle at Buena Vista. As a first lieutenant, he was on duty at Fort Sumter at the time of the bombardment in April, 1861. Later he served in Missouri, was at the battle of Pea Ridge, siege of Corinth, fight at Stone River; commanded the Fourteenth Corps in Sherman's army in Georgia; was brevetted major-general, and after the war was put in charge of the United States troops in Alaska. In 1873 he was at the head of the troops sent to subdue the Modoc Indians. In a quarrel at Louisville, Kentucky, Sept. 29, 1862, General Davis shot and killed General William Nelson, and was arrested, but after a time was liberated, but the case was never brought to trial. He died in Chicago, Illinois, Nov. 30, 1879.

DAVIS, Jessie (Bartlett), an American operatic contralto singer; born in Chicago in 1860; from a position as a church-choir singer, she went to one in the Chicago Church Choir Opera Company, singing as Little Buttercup in *Pinafore*, with great success. At 16 years of age she sang with Caroline Richings; in 1882 sang Siebel to Patti's Marguerite in the Mapleson Company in New York; was with the American Opera Company from 1886 till its dissolution; and has been the leading contralto singer with "the Bostonians." She married Will J. Davis, manager of the Columbia Theater, Chicago.

DAVIS, John, an American statesman; born in Northboro, Massachusetts, Jan. 13, 1787. He graduated at Yale, studied law and began to practice in Worcester. In 1824 he was elected to Congress, where he opposed Henry Clay's tariff bill and advocated a protective tariff. He was elected governor of Massachusetts in 1834, and afterward was sent to the United States Senate, and was again, in 1841, elected governor. Mr. Davis, when in Congress, opposed the Mexican War, advocated the exclusion of slavery from the territories, and for his uprightness was frequently called "Honest John Davis." He died in Worcester, Massachusetts, April 19, 1854.

DAVIS, John Chandler Bancroft, an American jurist and diplomat, born at Worcester, Massachusetts, Dec. 29, 1822; graduated at Harvard College in 1840, and, after three years of legal study, began the practice of law. In 1849 he entered the diplomatic service as secretary of legation at London, where he remained until 1852. On his return he resumed the practice of law in New York, and in 1869 was elected to the state legislature. Appointed assistant secretary of state at the commencement of President Grant's administration, he became American secretary in the joint commission which concluded the Treaty of Washington in the spring of 1871; prepared the American case for submission to the tribunal of arbitration for the settlement of the *Alabama* claims; went to Geneva as the agent of the United States at the meeting of the tribunal, and on his return in 1873 resumed the position of assistant secretary of state. He served as United States minister to Germany from 1874 to 1877, and on his return was appointed a judge of the court of claims. He became assistant secretary of state in 1881, and reporter of the United States supreme court in 1883. He published several law books, which include *The Massachusetts Justice* and *The Case of the United States Laid Before the Tribunal of Arbitration at Geneva*. From 1854 to 1861 Mr. Davis was American correspondent of the London *Times*.

DAVIS, Sir John Francis, an English Orientalist and army officer; born in London in 1795. He was long a resident in China as chief superintendent of Canton, and afterward as governor and commander-in-chief of the colony of Hongkong.

He was created a baronet in 1845. His *China During the War and Since the Peace* appeared in 1852, and was followed in 1857 by *China: A General Description of that Empire*, one of the most trustworthy authorities on China and the Chinese. He died in London, Nov. 13, 1890.

DAVIS, NATHAN SMITH, an American author and physician; born in Greene, Chenango County, New York, Jan. 9, 1817. He received his medical education in Fairfield, New York, and after ten years' practice in Binghamton, in his native state, accepted the professorship of physiology and pathology in Rush Medical College, Chicago, Illinois. He wasone of the founders of Northwestern University, the Washingtonian Home for Inebriates, and the Chicago Academy of Sciences. While in New York City in 1848 he was editor of the *Annalist*, and in Chicago conducted successively the *Medical Examiner*, *Northwestern Journal*, and *Journal of the American Medical Association*. In 1886 he became professor of the principles and practice of medicine in Chicago Medical College, and later dean of the faculty. He held many offices connected with scientific or educational institutions, and among his numerous writings are the following: *Essay on the Philosophy of Medicine; Remedial Value and Proper Use of Alcoholic Drinks; History of Medical Education;* and *Clinical Lectures*.

DAVIS, NOAH, an American jurist; born in Haverhill, New Hampshire, Sept. 10, 1818. After graduation from the Academy at Lima, New York, he undertook the study of law, and began practice at Gaines and in Buffalo, New York. In 1844 he entered into partnership with Sanford E. Church at Albion. From 1857 to 1868 he was a justice of the New York supreme court, and in the latter year was sent by the Republican party to Congress. In 1870 he accepted President Grant's appointment as United States attorney for the southern district of New York, and two years later became justice of the supreme court in the same district. The Tweed trial and the trial of Stokes for the murder of Fisk were celebrated cases which came before him. In 1887 he retired from office and resumed his practice.

JUDGE NOAH DAVIS.

DAVIS, REBECCA (HARDING), an American magazine writer and novelist; born at Washington, Pennsylvania, June 24, 1831; wife of L. Clark Davis, a journalist. Her early days were spent in West Virginia, and her first notable story was called *Life in the Iron Mills*, which appeared in the *Atlantic Monthly* in 1861. After her marriage she removed to Philadelphia, Pennsylvania, and in 1869 was given a place on the editorial staff of the New York *Tribune*. She has published a number of novels, the best known being *Margaret Howth* (1861); *Waiting for the Verdict* (1867); *Dallas Galbraith* (1868); *John Andross* (1874); *Berrytown* (1876); *Kitty's Choice* (1876); *A Law Unto Herself* (1878); *Naubasqua* (1886); *Dr. Warrick's Daughters* (1896).

DAVIS, RICHARD HARDING, an American editor and novelist, son of the preceding; born April 18, 1864, in Philadelphia, Pa.; was a student at Lehigh University, and afterward at Johns Hopkins University, where he received special training for a journalistic career. After several years' service as a reporter upon various Philadelphia papers, he became connected, in 1888, with the New York *Evening Sun*, in which appeared his first important stories. Two years later he was appointed managing editor of *Harper's Weekly*. He excelled in short story and descriptive writing, and traveled extensively in Europe and in South America for the sake of the latter. He has published *Stories for Boys; Gallagher, and Other Stories* (1891); *The Rulers of the Mediterranean* (1893); *Van Bibber and Others; The Exiles and Other Stories; Our English Cousins* (1894); *About Paris* (1895); *The Princess Aline* (1895); *Cinderella* (1896); and *The King's Jackal* (1898). His descriptive writings include *The West from a Car Window* and *Three Gringoes in Central America*. He contributed frequently to magazines.

DAVIS, WILLIAM MORRIS, an American geographer and meteorologist; born Feb. 12, 1850, in Philadelphia. He graduated from Harvard, and was a student at the Lawrence Scientific School. In 1870 he went to South America, and for three years was an assistant at Cordoba, in the national observatory of the Argentine Republic. His appointment as an instructor in geology in Harvard in 1876 was followed by his election to the professorship of physical geography in 1890. He contributed frequently to scientific journals.

DAVIS STRAIT, a body of water separating Greenland from Baffin Land, about 180 miles in width, and connecting Baffin Bay with the Atlantic Ocean. A branch of the Arctic current flows through this strait southward along the Atlantic coast of America. It is important as a whaling region.

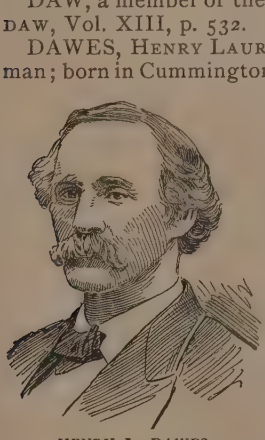
DAVITT, MICHAEL, founder of the Irish Land League, born in 1846 near Straid in County Mayo, Ireland, of poor parents. His father was the victim of a policy of eviction, and Michael Davitt was but four years of age when he saw his home destroyed. His father and mother took him to England, being so poor that they had to beg through the streets for bread. They settled at Haslingden, in Lancashire, and here the child was sent to a mill to work. An accident destroyed his right arm and turned him to books for self-education. In 1866 became connected with the Fenian movement, being concerned in the abortive attempt to seize Chester Castle. In 1870 he was sentenced to 15 years' imprisonment for treason felony, but was released on ticket of leave in 1877. In 1879 he founded, in conjunction with Charles S. Parnell, the Irish Land League. He made a tour of the United States on behalf of that organization in 1880, and on his return to England was again arrested on his

old sentence and held in prison for 15 months. On the day of his release, May 6, 1882, Lord Frederick Cavendish and Mr. Burke were assassinated in Phœnix Park, Dublin. Mr. Davitt, with Parnell and Dillon, issued a manifesto condemning the murders. While he was in prison he was elected a member of Parliament, but was not permitted to take his seat. Mr. Davitt wrote frequently on subjects both literary and political, and actively engaged in the cause of Irish nationalism. In 1892 he was elected to Parliament, after several unsuccessful contests, but was obliged to vacate his seat in 1893 because of bankruptcy proceedings taken against him.

DAVOUT (frequently erroneously written Davoust), Louis Nicholas, a marshal of France; born in Annoux, Yonne, May 10, 1770. He was educated with Napoleon at Brienne, and distinguished himself in nearly all the wars of the period. He won his greatest honors in the service of Napoleon, winning with his single corps the great battle of Auerstädt, while Napoleon conquered at Jena. Two years later (1808) he was made Duke of Auerstädt, and the following year Prince of Eckmühl. In 1804 he had been created marshal of the empire. He was governor of Poland, and governor-general of the Hanse towns after the retreat from Russia, and held many other positions of honor, displaying firmness and courage. He was Napoleon's Minister of War in 1815, during the Hundred Days; signed the capitulation of Paris, July 3, 1815, and a few days later retired to private life. In Poland he was charged with extreme severity, and he is accused of having followed Napoleon's example in extreme financial exactions. He is ranked universally among the greatest of corps commanders of the world. He died in Paris, June 1, 1823.

DAW, a member of the crow family. See Jackdaw, Vol. XIII, p. 532.

DAWES, Henry Laurens, an American statesman; born in Cummington, Massachusetts, Oct. 30, 1816. He graduated from Yale in 1839, and after several years' experience as a teacher became the editor of the Greenfield *Gazette*, and, later, of the Adams *Transcript*. He became a member of the legal profession, and was sent to the state legislature in 1848. From 1857 until 1873 he was a member of the Lower House of Congress, in which capacity he worked diligently in behalf of the Indians; was the author of several tariff bills, and served on important committees. He inaugurated the measure for the completion of the Washington Monument; was delegated to investigate disturbances in the Indian Territory; was author of the Severalty Bill, the Sioux Bill, and the bill which makes the Indians subject to and protected by United States criminal laws. In 1869 he introduced the "Weather Bulletin" measure—the collection and comparison of weather reports from all parts of the country, whereby probabilities as to coming storms may be predicted. Mr. Dawes served in the United States Senate from 1875 to 1893, and was a prominent member of the Committee on Ways and Means, and on that of appropriations. He declined a renomination.



HENRY L. DAWES.

DAWES ACT. See Indian Affairs, in these Supplements.

DAWKINS, William Boyd, an English geologist; born in Welshpool, Montgomeryshire, Dec. 26, 1838, and educated at Rossall School and Jesus College, Oxford. He joined the Geological Survey in 1862, became curator of Manchester Museum in 1869, and professor of geology in Owens College, Manchester, in 1874. The Channel Tunnel Committee employed him in 1882 to make a special survey of both coasts. The more important works of Professor Dawkins are *Cave-Hunting Researches on the Evidences of Caves Respecting the Early Inhabitants of Europe* (1874) and *Early Man in Britain, and His Place in the Tertiary Period* (1880), the latter a work of great interest.

DAWSON, a town, the capital of Terrell Co., Ga., 25 miles N.W. of Albany, on the Central of Georgia and the Columbus Southern railroads; has a factory of railroad cars, and is the seat of the South Georgia Male Institute. Pop. 1890, 2,284.

DAWSON. See Klondike, *post*, p. 1800*a*.

DAWSON, George Mercer, a Canadian scientist and author; born at Pictou, Nova Scotia, Aug. 1, 1849; the eldest son of Sir J. William Dawson. He was educated at McGill University and the Royal School of Mines, London; admitted to the associateship of the latter in 1872; held the Duke of Cornwall's scholarship, given by the Prince of Wales, and took the Edward Forbes medal in palæontology and the Murchison medal in geology. He was appointed geologist and naturalist to her Majesty's North American Boundary Commission in 1873. In 1875 he published a report of this work, entitled *Geology and Resources of the Forty-ninth Parallel*. From 1875 to 1879 he was occupied in the geological survey and exploration of British Columbia, and has since been engaged in similar work in the Canadian Northwest Territories. In 1882 he traveled extensively in Europe, inspecting mines, metallurgical works, museums, etc., and in 1887 was placed in charge of the Yukon expedition, undertaken by the Dominion government. In 1891 he was appointed (with Sir George Baden-Powell) one of her Majesty's Bering Sea commissioners. The following year he attended the meetings at Washington of an international commission, and aided in the preparation of a Parliamentary blue-book on the seal-fisheries, presented to the Canadian authorities. In 1893 he was a member of the Bering Sea arbitration which was convened at Paris. In 1891 he was awarded the Bigsby medal of the Geologi-

cal Society of London for his researches in the geology of Canada, and his account of the glacial phenomena of the northern part of the American continent and his investigations of the coal-measures of the Northwest Territories and British Columbia. The result of these varied studies appeared in the reports of the Geological Survey of Canada, of which he was appointed director in 1895. He was author of numerous papers, geographical, geological and ethnological, contributed to the *Quarterly Journal of the Geological Society of London*, to the *Transactions of the Royal Society of Canada*, of which he was president for the year 1893, and to the *Canadian Naturalist* and other scientific journals. He was made an honorary LL.D. of McGill University, and of Queen's University, Kingston, and in 1892 was made a companion of the Order of St. Michael and St. George.

DAWSON, Sir J. William, a Canadian geologist; born at Pictou, Nova Scotia, Oct. 13, 1820. He was educated at Pictou College and Edinburgh University. In 1842 he accompanied Sir Charles Lyell in his scientific explorations in Nova Scotia, where he made some valuable discoveries in palæontology. In 1843 he contributed a paper on the rocks of eastern Nova Scotia to the Geological Society of London; this was followed in 1844 by a paper on the newer coal formation. In 1845, besides exploring and reporting on the iron-mines of Londonderry, Nova Scotia, he published a paper on the coal formation plants of that province. He has discovered and described a number of fossils, of which the most important is named *Eozoön Canadense* (q.v., Vol. IX, p. 384), the oldest known form of animal life. It may be said that previous to this discovery the Laurentian rocks were regarded as devoid of animal remains, and were therefore called "azoic." For this term Dr. Dawson substituted "eozoic." From 1847 to 1849 he published *On the Triassic Red Sandstones of Nova Scotia and Prince Edward Island; On the Coloring Matters of Red Sandstones; On Erect Calamites, found near Pictou; On the Metamorphic Rocks of Nova Scotia;* and a *Handbook of the Geography and Natural History of Nova Scotia.* In 1850 Dr. Dawson became superintendent of education for his native province, and five years afterward was appointed principal of McGill University, Montreal, a position which he resigned in 1893. In 1852 he again accompanied Sir Charles Lyell in his geological researches in Nova Scotia and New Brunswick, examining the well-known Joggins mine, where he found the remains of *Dendrerpeton Acadianum* and of *Pupa Vetusta*, the former being the first reptile found in the coal formation of America, and the latter the first known Palæozic land-snail. In 1856 he prepared a description of the Silurian and Devonian rocks, visited Lake Superior, and wrote a paper and report on the copper regions of Maimanse and Georgian Bay. He devoted much attention to the study of fossil plants and Carboniferous reptiles, and to the physical and organic conditions of the more recent geological formations, and published many memoirs on these subjects in the *Transactions* of the Royal Society of Canada, of which Dr. Dawson was the first president, in the journals of the Geological Survey of Canada, as well as in many foreign scientific periodicals. He was also a large contributor to the *Canadian Naturalist.* In 1858 he published, under the title of *Archaia*, a series of *Studies on the Cosmogony* and *Natural History of the Hebrew Scriptures*, in which he went through the whole narrative of the six days of creation, and translated the language of Genesis into the modern scientific dialect. Among his later and popular works are *The Story of the Earth and Man* (1872); *The Dawn of Life* (1875); *The Origin of the World* (1877); *Fossil Men and their Modern Representatives* (1878); *The Chain of Life in Geological Time* (1880); and a *Handbook of Geology* (1884). In 1882 he received the Lyell medal of the Geological Society of London, was created companion of the Order of St. Michael and St. George, and became president of the American Association for the Advancement of science. He received the degrees of M.A. and LL.D. from the University of Edinburgh and of LL.D. from McGill University. In 1885 he was elected president of the British Association for the Advancement of Science, and an honorary fellow of the Geological Society of Edinburgh, and of the Philosophical Societies of Glasgow, Liverpool, Manchester and Leeds. His more recent works are *Modern Science in Bible Lands* (1888); *The Geological History of Plants* (International Scientific Series, 1888); *Modern Ideas of Evolution* (1890); *Salient Points in the Science of the Earth* (1893); and *The Canadian Ice Age* (1893). See Foraminifera, Vol. IX, p. 383.

G. Mercer Adam.

DAY, George Edward, an American theologian and exegete; born March 19, 1815, at Pittsfield, Massachusetts. After graduation from Yale College and Theological Seminary, he became assistant in sacred literature in the latter institution, continuing in that position until 1840. The next 11 years of his life were spent in pastoral duties at Marlboro and Northampton, Massachusetts. In 1851 he was elected professor of Biblical literature in Lane Theological Seminary, and in 1866 professor of Hebrew in the theological department of his *alma mater.* He frequently contributed to theological journals, and was editor of the *Theological Eclectic.* In 1871 he translated the *Biblical Theology of the New Testament* of Van Oosterzee, and in 1883 edited Oehler's *Biblical Theology of the Old Testament.*

DAY, Henry Noble, an American educationist, railroad president, and writer upon philosophical subjects, was born Aug. 4, 1808, at New Preston, Connecticut. His father was Jeremiah Day, a president of Yale College. The son graduated from Yale in 1828, and, after several years' service as a tutor in his *alma mater*, spent two years in European travel, becoming, shortly after his return in 1836, pastor of the Congregational Church in Waterbury, Connecticut. From 1840

until 1858 he was professor of rhetoric and homiletics at Western Reserve College, Cleveland, Ohio, managing, meanwhile, the Cleveland and Pittsburg railroad. In 1858–64 he was president of Ohio Female College, and in 1864 removed to New Haven, Conn., where he wrote textbooks on philosophical subjects for use in colleges, including *The Art of Discourse; Elements of Logic; Logical Ethics; Science of Thought;* and *The Elements of Psychology.*

DAY, Horace Hollister, an American manufacturer and capitalist; born in Massachusetts in 1813. He acquired a large fortune, most of which he lost in speculation in the manufacture of India rubber and through his celebrated lawsuit with Charles Goodyear, for which Daniel Webster left the Senate in order to argue the case for Goodyear. When he lost the case, Day surrendered his license and his factory. He was the first to successfully utilize any portion of the water-power at Niagara, and completed the canal at an expense of over $900,000. The work passed out of his hands through the foreclosure of mortgages. He was an inventor of great skill, and an unflinching champion of the working classes. At the time of his death, in Manchester, N. H., Aug. 23, 1878, he was engaged in business operations near Montreal, Canada. He was a powerful speaker and writer, and devoted much of his time to the labor question.

DAY, Jeremiah, an American educationist; born in New Preston, Conn., Aug. 3, 1773; graduated with honors at Yale in 1795; became tutor at Williams, and later at Yale, where, in 1803, he became professor of mathematics and natural philosophy, and, in 1817–46, president. He wrote a work on algebra and plane trigonometry; also *Mensuration of Superficies and Solids; Navigation and Surveying;* and *An Inquiry on the Self-Determining Power of the Will.* Died in New Haven, Aug. 22, 1867.

DAY, Thomas, an English political writer and poet; born in London, June 22, 1748. He studied law, but turned his attention to literature, and warmly sympathized with the cause of American independence. His two poems, *The Devoted Legions* and *The Desolation of America,* were written during this period. He is best known as the author of *The Dying Negro* (1773); *Sandford and Merton* (3 vols., 1783–89); and the *History of Little Jack.* His death, Sept. 28, 1789, was caused by a fall from a horse.

DAY, William Rufus, American lawyer and statesman; born at Ravenna, Ohio, April 17, 1849.

WILLIAM R. DAY.

His father was Chief Justice Luther Day, for many years a prominent lawyer in Ohio; and his maternal and paternal grandfathers were Supreme Court Justices. In 1870 he graduated at the University of Michigan; he afterward studied law there, and was admitted to the Ohio bar in July, 1872. In October, 1872, he formed a partnership with William A. Lynch, and commenced practice in Canton, Ohio, where he soon formed a friendship with Major William McKinley, afterwards President. In 1886 he was elected Judge of the Court of Common Pleas of the ninth judicial district of Ohio, but, for financial reasons, resigned in 1887. In 1889 he was appointed judge of the United States District Court for northern Ohio, but declined the office in consequence of ill health. In April, 1897, he was appointed first assistant Secretary of State, and on April 26, 1898, Secretary of State. On the conclusion of the war with Spain, Judge Day was, on Aug. 26, 1898, appointed chairman of the peace commission, and with his colleagues ably conducted the negotiations at Paris, from October 1 till the signature of the treaty on December 10. On Feb. 25, 1899, he was appointed judge of the Sixth Judicial Circuit. On Aug. 24, 1875, Judge Day was married to Miss Mary E. Schaefer, of Canton, and has had four children, all boys.

DAY-LILY, the common name of *Hemerocallis,* a genus of plants of the family *Liliaceæ,* having yellow funnelform ephemeral flowers, grassy, linear leaves, a thick pod, and roundish black seeds with a hard and brittle coat. *H. fulva* and *H. flava* are common garden forms, both natives of the Old World, the former having become naturalized in the United States.

DAYS OF GRACE, days given by law to the acceptor of a bill of exchange or the maker of a promissory note, as additional time in which to make payment. By the law-merchant, the maker of a bill of exchange is entitled to days of grace. This allowance was formerly made as a favor, but the custom grew into law. By the statute, in England, making promissory notes negotiable, days of grace were also given. This statute has been adopted in most of the states of the United States, though in some it has been since repealed. Where days of grace are allowed in the United States, the maturity of a negotiable instrument is determined by adding three days to the term for which the instrument runs. If the last day of grace is Sunday or a legal holiday, the instrument falls due on the preceding day. Days of grace are not allowed upon notes or bills payable on demand. See also Bill, Vol. III, pp. 673–74.

DAYTON, a city of Campbell Co., Ky., on the Ohio river, opposite Cincinnati; has manufactories of ropes, shoes, and cigars, and several distilleries. Population 1890, 4,264.

DAYTON, a mining town, the capital of Lyon Co., Nev., on the Carson river, 11 miles N. E. of Carson City; is engaged in silver mining, and contains a number of quartz-mills. Population 1890, 576.

DAYTON, a city, capital Montgomery Co., Ohio, the terminus of seven railroads. It manufactures cotton and woolen goods, oil, flour, machinery, railroad cars, paper, stoves, hollow-ware, agricultural implements, furniture, carriages, etc. In 1890 it had nearly 950 manufacturing establishments, with a combined capital of over $13,000,000, and an annual product of $25,000,000. It has an admirable system of public schools, also a high school, two Catholic schools, several high-grade preparatory schools for boys, and Deavor's College for boys. Its public buildings are beautiful and imposing, and include the county courthouse, jail, public markets, and the National Soldiers' Home. The jail is of stone, and cost $400,000. Popula-

tion 1890, 61,220. See DAYTON, Vol. VI, p. 848.

DAYTON, a city and the capital of Rhea County, eastern central Tennessee, 34 miles N.N.E. of Chattanooga, on the Cincinnati, New Orleans and Texas Pacific railroad. It is in a coal and iron mining region, and has smelting-furnaces, brickyards, flouring-mills, machine-shops and other industries. Population 1890, 2,719.

DAYTON, a town of southeast Washington, the capital of Columbia County, about 30 miles N.E. of Walla Walla, on the Oregon and Washington and Columbia River railroads. It contains a variety of manufactures and is the trade center of a rich agricultural district. Ten miles south the Blue Mountains afford a favorite summer resort. Population 1890, 1,880.

DAYTON, WILLIAM LEWIS, an American statesman; born at Baskingridge, New Jersey, Feb. 17, 1807. He graduated from Princeton College in 1825, and having studied law in Litchfield, Connecticut, was admitted to the bar in Trenton, New Jersey, in 1830; he was elected to the state senate in 1837, and in 1838 was made a justice of the state supreme court. He served in the United States Senate from 1842 to 1851, and as attorney-general of New Jersey from 1857 to 1861. The newly formed Republican party nominated him in 1856 for Vice-President of the United States, and was defeated on that ticket headed by John C. Frémont. President Lincoln appointed him minister to France in 1861, and he continued in this position until his death, which occurred in Paris, Dec. 1, 1864.

DAZA, HILARION, a Bolivian politician and revolutionist; born in the city of Sucre, Bolivia, in 1840. He was partly of Indian blood. At the age of 18 he entered the army of Liberals, and during a series of revolutions won the regard of President Melgarejo. In 1871 he turned against his friend, and for his service in quieting the turbulent factions President Morales, who had supplanted Melgarejo, promoted Daza and made him Secretary of War. Morales died in 1872, and in a subsequent election Daza claimed to be elected, seized the government, and was inaugurated, May 4, 1876. His administration was popular, and as quiet as any previous one. In 1879 the war with Chile broke out. Daza left the government in the hands of his Foreign Minister, while he marched with 4,000 Bolivian soldiers into Peru and southward to Chile. After entering Chile, however, he left his army to its fate and hurried back to the capital. Before reaching it he heard there had been a revolution in La Paz and General Narciso Campero had been chosen as his successor. Daza fled to France. He returned to Bolivia a few years later, but always was regarded with suspicion. He was killed by a Bolivian mob at Urjini, March 1, 1894.

DEACONESS, an order of women, in the early centuries, connected with the Roman Catholic Church, but abolished by that church during the twelfth century. The modern order of deaconesses is not necessarily connected with any church. The members are generally middle-aged women of some leisure who devote their time to the care of the poor and visitation of the sick. For the ancient order, see DEACON, Vol. VII, p. 1. The order of to-day found its beginning in 1836 at Kaiserswerth, Germany, where the first "Deaconess Home" was established by Theodor Fliedner, one of the most prominent of the theologians of the German Church. The order founded by him had no connection with the church. The "Home" served both as a central refuge, headquarters and training-school. Similar institutions were afterward founded by Fliedner in various parts of Europe. The first home at Kaiserswerth has remained the central mother-house. The Church of England and the Protestant Episcopal Church in the United States have established the deaconess order as a part of their church governments. The Lutheran Church in America recognizes the order. In connection with that church there is maintained at Philadelphia the Drexel Home for Deaconesses, erected in 1888 by the generosity of J. D. Lankenau of that city. Within recent years the Congregationalists, in some of their churches, have given the order recognition. Other churches, while agreeing with the purposes of the institution, do not feel justified in incorporating it in the church government. The deaconess order, on the whole, is an independent society of charitable women, and they include in their number many trained nurses. See also METHODIST CHURCHES, in these Supplements.

DEAD FREIGHT, the compensation paid by the merchant who freights a whole ship to the shipmaster for the space which is not occupied. It is rather a claim for damages for the loss of freight, and consequently, apart from positive stipulation, the shipmaster has no lien for dead freight over the goods on board. His claim must, consequently, be made effectual by a personal action against the freighter.

DEAD-LETTER OFFICE. See POST-OFFICE, Vol. XIX, p. 579.

DEADLY NIGHTSHADE. See BELLADONNA, Vol. III, p. 543.

DEAD-NETTLE, the common name of *Lamium*, a genus of herbaceous plants of the family *Labiatæ*, having a five-toothed calyx, the upper lip of the corolla arched and the lower lip three-lobed. The name is given for a certain resemblance to the true or stinging nettle. The species are natives of the Old World, but in the United States *L. amplexicaule* is a common weed, and *L. album* and *L. maculatum* are cultivated for their handsome flowers.

DEAD-OIL OR CREASOTE. See Vol. VI, p. 556.

DEAD-RECKONING. See NAVIGATION, Vol. XVII, p. 264.

DEADWOOD, the capital of Lawrence County, central western South Dakota, situated among the Black Hills, of which it is the commercial entrepôt, on the Fremont, Elkhorn and Missouri Valley railroad. It was founded about 1876, when auriferous and argentiferous deposits were dis-

covered in the Black Hills country, and for some time it filled a considerable place in the public mind. Although very difficult of access, at that time it became the Mecca of thousands of miners and traders. It has flouring-mills, saw-mills, planing-mills, and manufactories of lumber, brick and lime. Its principal streets are macadamized and it is supplied with water and electricity. Population 1890, 4,204.

DEAF MUTES, EDUCATION OF THE. In 1895 there were in the United States 80 schools, including both private and public, for deaf mutes. These schools had 9,304 mutes in attendance. See also DEAF AND DUMB, Vol. VII, pp. 3–12.

DEAFNESS. See EAR, Vol. VII, p. 594.

DEAL-FISH. See RIBBON-FISHES, Vol. XX, p. 531.

DEALS, a term used more in Great Britain than in the United States, and especially of the lumber of fir trees. In the United States a deal is a plank or timber 12 feet long, 11 inches wide, and 2½ inches thick. In England a deal is lumber not exceeding 3 inches in thickness and 9 inches wide. For the various kinds of fir-deal, see FIR, Vol. IX, p. 223.

DEAN, AMOS, an American lawyer; born in Barnard, Vermont, Feb. 16, 1803; died Jan. 26, 1868. A graduate of Union College and a law student, he was admitted to the bar and acquired a high reputation in the legal profession. He was one of the leaders in founding the Young Men's Association at Albany; was a professor in the Albany Law School and professor of medical jurisprudence in the Albany Medical School. He published a number of works on legal subjects which were much sought after. These works include *Medical Jurisprudence* (1854), *Manual of Law* (1838), and *Bryant and Stratton's Commercial Law* (1861).

DEAN, FOREST OF, a picturesque hilly tract, 34 square miles in extent, an ancient royal forest in the west of Gloucestershire, between the Severn and the Wye, and within the hundred of St. Briavels. It was almost entirely disafforested by Charles I on a sale to Sir John Wintour, but was reafforested by act of Parliament very shortly after the Restoration. The greater part still remains crown property, and about one half is appropriated for the growth of timber for the navy. It is divided into six "walks," which contain woods of oak, beech, etc. There are coal and iron mines, and quarries of stone suitable for building and making grindstones, troughs and rollers. Persons born in the hundred, and residing and working a year and a day in the mines, become, on registration, free miners. Their ancient privileges entitling them exclusively to grants of the crown mines (subject to the right of the crown to put on a fifth man for every four miners, now commuted for a royalty), and, formerly, to timber for the mines, were regulated and enforced by the Mine Law Court, held at the Speech House, within Dean Forest, where the Verderer's Court is still held, but have, with some variations, been defined and confirmed by several acts and commissioners' awards of the present century. Dean Forest is under the control of the Commissioners of Woods and Forests, one of whom, as "gaveler," has the supervision of the mines, and a deputy surveyor, four verderers (whose office, since the extermination of the deer in 1854, is almost a sinecure), and other officials. For a description of the coal-fields, see COAL, Vol. VI, p. 50.

DEANE, CHARLES, an American historical writer; born in Biddeford, Maine, Nov. 10, 1813; died in Cambridge, Massachusetts, Nov. 13, 1889. He was educated at Thornton Academy, Saco, Maine, and became a merchant in Boston. After 1864 he resided in Cambridge, having retired from business, and wrote a number of valuable historical papers. Among these works may be mentioned *First Plymouth Patent* (1854); *Bibliography of Governor Hutchinson's Publications* (1857); and *Remarks on Sebastian Cabot's Mapple Monde* (1867).

DEANE, JAMES, an American geologist; born in Colerain, Massachusetts, Feb. 14, 1801; died in Greenfield, Massachusetts, June 8, 1858. He studied law and medicine, and practiced the latter. Much of his life was given to geological research, and he was the discoverer of fossil footprints in the Red Sandstone of the Connecticut valley. This discovery attracted widespread attention on the part of geologists, and gave rise to a careful study of that region on the part of several of the more prominent naturalists. An illustrated work containing the results of his geological labors has been issued since his death by the Smithsonian Institution. Mr. Deane was a contributor to scientific and medical journals.

DEANE, JAMES, an American missionary to the Indians; born in Groton, Connecticut, Aug. 20, 1748; died in Westmoreland, Oneida County, New York, Sept. 10, 1823. He was graduated at Dartmouth in 1773; was missionary to the Canadian Indians from 1773 to 1774, and during the Revolutionary War was stationed at Fort Stanwix as Indian agent and interpreter, with the rank of major. At the close of the war the Indians gave him a tract of land near Rome, Oneida County, which he exchanged for a tract in Westmoreland, to which he removed in 1786. He was for some time judge in Oneida County.

DEANE, SILAS, an American diplomatist; born in Groton, Connecticut, Dec. 24, 1734; died in Deal, England, Aug. 23, 1789. He was graduated at Yale in 1758; was a delegate from his state to the Continental Congress of 1774–76, and in the last year was sent to France with Dr Franklin and Arthur Lee on a financial and political mission. Through his influence La Fayette, De Kalb and other foreigners were induced to serve in the American army. Congress recalled him in 1777, as suspicions had arisen that he had persuaded them by profuse promises and had made extravagant contracts. Being obliged by Congress to account for his operations, he returned to France for papers to substantiate his declarations, and found the government embittered against him by

the publication of certain private dispatches. He died among strangers, in poverty, and an investigation, made in 1842, showed that he had been wronged by his country and his political enemies. A large sum of money shown to be due him by the government was paid at that time to his heirs. At the time when his reputation was being assailed, and he deemed it necessary to defend himself, he published *Letters to Hon. Robert Morris* (1784); *An Address to the Free and Independent Citizens of the United States* (1784); and *Paris Papers, or Mr. Silas Deane's Late Intercepted Letters to His Brother* (1781).

DEARBORN, HENRY, an American physician and soldier; born in Hampton, New Hampshire, Feb. 23, 1751; died in Roxbury, Massachusetts, June 6, 1829. He studied and began the practice of medicine at Nottingham Square in 1772, and during his leisure made a study of military tactics, making his knowledge available during the Revolutionary War. The day following the battle of Lexington, with sixty minute-men he marched to Cambridge and covered the American retreat at Bunker Hill; he accompanied Arnold's expedition to Canada, where he was taken prisoner in the attack on Quebec; he fought at the battles of Stillwater, Saratoga, Monmouth and Newtown, and at the siege of Yorktown. After the war he was appointed United States marshal for Maine, twice elected to Congress, was Secretary of War under President Jefferson, collector of the port of Boston, and in 1812 was advanced to major-general, assigned to the northern department and took part in the war, capturing York (now Toronto) and Fort George. He was suspected of political intrigues and recalled, but was at once appointed commander of New York City, and in 1822 President Monroe sent him as minister to Portugal. A military post in Chicago, evacuated by the United States troops in 1812, was named after General Dearborn.

DEATH, the cessation of life in animals or plants, when the vital functions cease to perform their work. In a human being, death may result from natural decay, as in old age, or from failure of the heart, the lungs, or the brain. See NUTRITION, Vol. XVII, p. 686.

DEATH-ADDER. See SNAKES, Vol. XXII, p. 198.

DEATH-BED DECLARATION. See WILL, Vol. XXIV, p. 573; EVIDENCE, Vol. VIII, p. 741.

DEATH, CIVIL. Death from a legal point of view, is either natural or civil: the former being the cessation both of physical life and of the legal rights which attach to it; the latter, the cessation of the legal rights whilst the physical life remains. A man was said to be civilly dead, in England, when he had been attainted of treason or felony, or had abjured the realm, or was banished, or became professed in religion by going into a monastery. In these events his property devolved as if he were naturally dead. The doctrine of civil death was abolished in England in 1870 except as to cases of outlawry, in which it seems still to be applicable.

DEATH'S-HEAD MOTH. See BUTTERFLIES, Vol. IV, p. 596.

DEATH VALLEY. See CALIFORNIA, Vol. IV, p. 698, and AMARGOZA DESERT in these Supplements.

DEATH-WATCH, a ticking or rapping noise produced by various insects, particularly *Anobium*, in houses. From the fact that the sound is, in consequence of the prevailing quietude, oftenest heard during times of sickness and anxiety, it has been regarded as indicative of approaching death. See COLEOPTERA, Vol. VI, p. 132.

DEBATABLE LAND, a tract on the west border of England and Scotland, between the Esk and Sark rivers, which, for a long time previous to 1542, was claimed by both countries. In this year it was divided by royal commissioners by a line drawn from east to west between the rivers, about five miles above their mouths, Scotland receiving that part of the tract which lay north of the line, and England the remaining part. For a long time afterward it was the home of outlaws. The country is level and moory, but is now being improved.

DEBAY, AUGUSTE HYACINTHE, a French painter and sculptor; born at Nantes, 1804. In 1824 he secured the grand prize of the Academy of Fine Arts. Among his more notable pictures are *The Field of the Cloth of Gold*, for the Museum of Versailles; *The Battle of Dreux*; and others of equal merit. His masterpieces in sculpture are the mausoleums of the Archbishop Affre and the Countess of Damas, and the statue of Perrault for the new Louvre; In 1843 Debay executed works for the Church of Saint Peter, at Chaillot, and in 1861 the pediment of the fountain of Saint Michel. He died in 1865.

DEBAY, JEAN-BAPTISTE-JOSEPH, a French sculptor; born at Malines, in 1779. He was a pupil of the Academy of Fine Arts, and chevalier of the Legion of Honor. His works in the Hôtel de Ville and library at Hautes are well known. Among his more important productions are an equestrian statue of Louis XIV for the city of Montpellier; *Pericles*, in the garden of the Tuileries; *Charles Martel*, in the Museum of Versailles; *Colbert*, at the Palace of the Luxembourg; *Saint Sebastian*, in the Church of Saint-Merri; *Saint Matthew*, in the cathedral of Arras. He died in 1864.

DEBLAI. See FORTIFICATIONS, Vol. IX, pp. 429, 435.

DEBORAH, the name of two Biblical characters. The first, mentioned in Genesis xxxv, 8, and xxiv, 59, lived about 1857 B.C. She left Bethuel with Rebekah, and to all indications was Rebekah's nurse. She is mentioned by name but once; on the occasion of her burial under the tree Allonbachuth, at Beth-el.

The second, of whom mention is made in Judges iv and v, lived about 1316 B.C. She was an Israelitish prophetess, called by some a judge. She it was who predicted the death of Jabin, king of Canaan, an enemy of Israel. In all probability, she was a member of the tribe of Ephraim.

DE BOW, JAMES DUNWOODY BROWNSON, an American journalist; born in Charleston, South Carolina, July 10, 1820; died in Elizabeth, New

Jersey, Feb. 27, 1867. He was admitted to the bar of South Carolnina in 1843, but did not practice, engaging in journalism instead. He was possessed of an aptitude for statistical research, and much of his writing was in that line. He was editor of the *Southern Quarterly Review* in 1844–45. In 1845 he established, in New Orleans, the *Commercial Review*, which he continued in that city until the Civil War. He was appointed professor of political economy in the University of Louisiana in 1848; in 1853 he became superintendent of the United States census, holding the office until 1855. He was an active Southern partisan, and took a prominent part in secession politics. He resumed the publication of his *Commercial Review* in Nashville, Tennessee. Among his collected writings are *The Industrial Resources and Statistics of the Southwest* (1853) and *Statistical Review of the United States* (1856).

DEBS, EUGENE V., an American labor leader; born in Terre Haute, Indiana, in 1855, and educated in the public schools, and when 16 years old began work as a painter and railroad fireman. When 26 years old he was chosen a member of the state legislature, where he secured the passage of several laws in the interest of labor. He was grand secretary and treasurer of the Brotherhood of Locomotive Firemen for 14 years. Always an earnest advocate of a federation of railway men, the United Order of Railway Employees was formed through his efforts, and the American Railway Union was organized by him in Chicago, June 20, 1893. It prospered, and became the largest body of railway men in the world, and won a victory in its strike against the Great Northern railway.

In July, 1894, the American Railway Union, under Debs's guidance, espoused the cause of the Pullman Palace Car Company's workmen in their strike for higher wages, and after failing to secure arbitration, ordered a boycott of all Pullman cars, which precipitated a great railroad strike, with Chicago as a storm-center. Cars were derailed or burned and trains stopped by strike sympathizers until President Cleveland ordered Federal troops to the scenes of disturbance to enforce the decrees of the United States Courts, and to prevent interference with the mail service and interstate commerce. Then traffic was gradually resumed with new men and the strike called off. Debs and his fellow-directors of the American Railway Union were indicted for conspiracy, but the trial jury disagreed. They were sentenced to six months in jail by Judge Woods of the United States circuit court, for contempt of court in violating an injunction. An appeal was taken to the United States supreme court, but the decision was confirmed. Upon his release, Debs again engaged in labor organization work. The whole subject of the strike was ably dealt with in the Report of the Railway Strike Commission.

*DEBT, UNITED STATES NATIONAL. The principal of the public debt at the outbreak of the war was only $64,842,288; the net ordinary receipts about $55,000,000 per annum. To meet the expenses of the war, Congress passed the act of July 17, 1861, in accordance with the suggestions of the Secretary of the Treasury, under which there were issued $50,000,000 bonds, redeemable in 20 years, bearing 6 per cent interest; $139,999,750 treasury notes, called 7.30's, payable in three years, bearing $7\frac{3}{10}$ per cent interest; and $50,000,000 Treasury notes, payable on demand, not bearing interest. The latter were subsequently increased to $60,000,000. These loans were favorably received, and were taken at a little less than par in gold by the state banks, and $189,321,350 of them were refunded into 20-year 6-per-cent bonds, authorized by act of Aug. 5, 1861. When Congress convened on Dec. 2, 1861, the financial condition of the government was more alarming than at any period during the war.

The above-mentioned act of July 17, 1861, gave the Secretary of the Treasury ample authority to borrow money on the credit of the government, but he could not deal with the system of state banks then existing in the several states. He was forbidden by the Subtreasury Act of 1846 to receive notes of state banks, and was required to receive into and pay from the Treasury only the coin of the United States; but by the act of Aug. 5, 1861, he was permitted to deposit, to the credit of the Treasurer of the United States, in such solvent specie-paying banks as he might select, any moneys obtained from loans, the moneys thus deposited to be withdrawn only for transfer to the regularly authorized depositories, or for the payment of public dues, as he might deem expedient. He had, however, no authority to receive from individuals or banks any money but coin. The coin received from the Boston, New York and Philadelphia banks in payment of their subscriptions to the government loans to the amount of nearly $150,000,000, had to be sent all over the United States to meet public obligations, and when thus scattered was not readily returned to the banks, thus exhausting their resources and their ability to loan again.

Mr. Chase, the Secretary of the Treasury, in December, 1862, estimated that there would be needed for the support of the government to June 30, 1863, $277,000,000; for the following year $900,000,000. Thereupon Congress undertook to provide this vast amount, mainly by borrowing, and passed an act, approved Feb. 25, 1862,—the most important loan measure enacted during the war,—authorizing the issue of $150,000,000 United States legal tender notes, of which $50,000,000 were to be in lieu of the demand Treasury notes already described, and the issue of $500,000,000 bonds, redeemable, at the pleasure of the United States, after 5 years, and payable 20 years from date, bearing 6 per cent interest. These were what were known as the 5-20 bonds. The amount of these bonds was subsequently increased $11,000,000.

An act approved July 11, 1862, authorized an additional issue of $150,000,000 legal tender notes. The act of March 3, 1863, authorized the issue of $900,000,000 of bonds, redeemable in

*Copyright, 1897, by The Werner Company.

10 years, and payable in 40 years, known as the 10-40's, bearing 5 per cent interest, specifically exempt from taxation by or under state or municipal authority; also, $400,000,000 interest-bearing Treasury notes, $150,000,000 more of the legal-tender notes, and $50,000,000 of fractional notes. The act of June 30, 1864, authorized an additional loan of $400,000,000, the rate and period to be fixed by the Secretary of the Treasury. All these loans were disposed of at not less than par in the paper currency of the country, and, with the duties and taxes imposed, furnished the means for funding the floating debt and finishing the war. The ascertained debt of the country reached its highest point Aug. 1, 1865, being then, less cash in the Treasury, $2,756,431,571.

Immediately upon the close of the war, with its enormous expenditures, the receipts from taxation began to give relief, but by an act of March 3, 1865, a further issue of $600,000,000 of the so-called 7.30 notes and an indefinite amount of 6-per-cent bonds was authorized, into which might be converted maturing loans and obligations.

The refunding act of July 14, 1870, authorized the issue of $200,000,000 5-per-cent bonds, $300,000,000 4½-per-cent bonds and $1,000,000,000 4-per-cent bonds, all payable, principal and interest, in coin, into which to refund bonds bearing a higher rate of interest. The act of Jan. 20, 1871, increased the amount of 5-per-cent bonds to $500,000,000. By Aug. 24, 1876, all of these 5-per-cent bonds had been sold for refunding purposes, and on that day the sale of $40,000,000 4½'s was contracted for like purpose. On June 9, 1877, the 4-per-cent bonds were placed on the market, and met with much favor. Of the subscriptions received, $45,000,000 of gold coin was reserved to provide for the resumption of specie payments, as authorized by the act of July 14, 1875.

On the 11th of April, 1876, the Secretary of the Treasury, under the authority given in the act of Jan. 14, 1875, sold $50,000,000 of 4½-per-cent bonds for gold coin, also to be used for resumption purposes.

The immediate effect of the resumption of specie payments which followed was to advance the public credit, making it possible to rapidly fund all the bonds of the United States then redeemable into bonds bearing 4 per cent or less interest.

The act of Jan. 25, 1879, extended the process of refunding to the 10-40 bonds bearing interest at the rate of 5 per cent, amounting to $195,000,000, and the act of February, 1879, authorized the issue of ten-dollar certificates of deposit convertible into 4-per-cent bonds.

In April, the refunding operations were for the time concluded, all the 5-20 and 10-40 bonds having been refunded. On the 1st of March, 1881, a bill "to facilitate the refunding of the national debt," having passed both Houses of Congress, was sent to President Hayes, who returned it to Congress with his disapproval. The bill provided for the issue of 3-per-cent bonds, to be exchanged for maturing bonds bearing 5 and 6 per cent, and also provided that no bonds should be taken as security for bank circulation except the 3-per-cents provided for in the bill. This latter provision was the chief objection of the President to the bill, as, in his judgment, the security was insufficient. Thus Congress adjourned without making any provision for refunding the large amount of bonds that became due on or before the 1st of July. These, however, were called in, from time to time, by Secretary Windom, for payment from the surplus revenue, but permission was given the holders of the bonds to have them continued, at the pleasure of the gvoernment, with interest at the rate of 3½ per cent.

Nearly all the holders preferred to retain their bonds, and thus they were refunded with an annual saving in interest of over ten million dollars.

By a provision of the National Bank Act of July 12, 1882, the Secretary of the Treasury was authorized to receive the 3½-per-cent bonds, and to exchange therefor 3-per-cent bonds. The 3½-per-cent bonds then outstanding amounted to $449,324,000. These were mostly exchanged for 3-per-cents, and all were subsequently paid, from time to time, by surplus revenue. The 4½-per-cent refunding bonds have also been paid from surplus revenue, except about $25,000,000, continued at 2½ per cent, and also a considerable portion of the 4-per-cent bonds.

The bonds sold by the Cleveland administration to reinforce the gold reserve were 5 and 4 per cents, of the description authorized by the refunding act of 1870.

The total interest-bearing bonded indebtedness of the country, March 1, 1896, was $822,615,170, not including about $25,000,000 of 4-per-cent bonds sold, but not then delivered.

See FINANCES OF THE UNITED STATES, in these Supplements.

JOHN SHERMAN.

TITLE OF LOAN.	AUTHORIZING ACT.	RATE.	WHEN REDEEMABLE.	OUTSTANDING MARCH 1, 1896.
Funded Loan of 1891	July 14, 1870, and Jan. 20, 1871	4½ per cent Cont'd at 2%	Option U. S.	$25,364,500
Funded Loan of 1907	July 14, 1870, and Jan. 20, 1871	4 per cent	July 1, 1907	559,634,300
Refunding Certificates	Feb. 26, 1879	4 per cent		48,720
Loan of 1904	Jan. 14, 1875	5 per cent	Feb. 1, 1904	100,000,000
Loan of 1925	Jan. 14, 1875	4 per cent	Feb. 1, 1925	137,567,650
Aggregate of interest-bearing debt, exclusive of United States bonds issued to Pacific railroads				$822,615,170

DEBTS OF VARIOUS COUNTRIES. The following table shows the indebtedness of foreign nations to Jan., 1895, in United States currency:

Names of Countries.	Debt, Less Sinking Fund.		Debt per Capita.	
	1890.	1895.	1890.	1895.
Argentine Repub.	$284,867,069	$244,680,381	$70.40	$63.12
Austria-Hungary	2,866,339,539	2,021,488,638	70.80	48.50
Belgium	380,504,099	447,075,229	63.10	70.05
Bolivia	14,763,367	9,493,705	12.38	4.60
Brazil	585,345,927	445,455,035	41.80	31.66
Chile	85,192,339	128,853,463	31.96	43.50
Colombia	63,451,583	46,291,977	16.36	16.62
Denmark	33,004,722	52,107,006	15.66	23.75
France (including Tunis)	4,564,808,000	6,096,231,785	120.65	159.30
Germany—				
Empire proper	77,577,719	410,112,975	1.57	8.34
Bavaria	335,503,105	88,599,041	60.03	16.35
Hamburg	59,202,946	81,665,365	94.85	131.20
Prussia	1,109,384,127	1,570,966,554	37.03	52.65
Saxony	143,897,747	16,738,034	41.11	4.85
Würtemberg	107,735,500	115,928,573	52.93	54.10
Great Britain and Ireland	3,350,719,563	3,330,803,035	87.79	87.71
India	881,003,592	641,505,500	3.27	2.30
Cape of Good Hope	110,817,720	124,998,805	77.56	81.60
Mauritius	8,464,662	2,941,955	22.92	7.85
Natal	22,028,424	40,272,715	45.76	75.00
Canada	237,533,212	253,074,927	47.51	49.23
New S. Wales	233,289,245	191,021,265	214.87	152.70
New Zealand	184,898,305	201,934,820	298.01	302.75
Queensland	129,204,750	153,197,670	333.46	344.50
South Australia	202,177,500	114,032,500	321.00	181.15
Tasmania	23,335,345	38,218,020	147.46	246.20
Victoria	179,614,005	234,021,210	161.63	190.30
W. Australia	6,509,736	17,086,695	150.23	190.78
Greece	107,306,518	164,721,830	49.06	75.10
Guatemala	10,825,836	13,901,415	7.59	9.25
Haiti	13,500,000	18,310,000	14.06	18.30
Hawaii	2,302,235	3,697,195	26.57	36.96
Honduras	63,394,267	30,063,790	146.77	69.20
Italy	2,324,826,329	2,529,668,035	76.06	82.70
Japan	305,727,816	202,112,245	7.83	4.91
Mexico	113,606,675	83,500,000	9.98	8.27
Netherlands	430,589,858	457,470,065	95.56	96.70
Nicaragua	1,711,206	575,667	4.28	9.29
Paraguay	19,633,013	2,228,049	59.56	4.65
Peru	382,175,655	178,943,000	145.77	65.10
Portugal	633,426,840	742,450,515	130.66	172.50
Roumania	180,145,800	237,928,150	32.75	44.55
Russia	4,010,018,074	2,696,730,000	30.79	22.40
Salvador	6,033,300	6,717,640	9.05	10.30
Servia	60,811,330	65,400,000	30.20	28.35
Spain	1,251,453,696	1,192,408,600	73.85	67.20
Sweden and Norway—				
Sweden	64,220,807		13.53	
Norway	13,973,752	39,871,210	7.13	19.30
Switzerland	10,912,925	11,530,600	3.72	3.80
Turkey	729,507,200	900,000,000	34.70	48.75
Egypt	517,278,200	527,375,000	75.88	77.25

See National Debt, Vol. XVII, pp. 243–248.

DECACHORD, a sort of guitar, with ten strings, similar to the common instrument, only larger in the body and with a broader finger-board. It was generally triangular in shape, and was much used by the ancient Greeks, and is still used in some parts of Greece to-day.

DECADENCE (literally, "a falling into decay"), a term referring to those works of art produced after the school to which they belong has passed the period of its highest excellence. In the days of Pericles, art in all its branches attained its greatest perfection in Greece, and the many exquisite works produced at a later date belong, more or less conspicuously, to the decadence of Greek art. Art and literature culminated in Rome in the days of Augustus, and obvious and rapid decadence followed. The school of the Renaissance again came into perfection with Raphael; even the Caracci belong to its decadence, and the decline continued through the rococo of Louis Quinze, till throughout Europe art became almost extinct, and in England it probably reached as low a point at the beginning of the reign of George IV as it ever reached in any civilized country.

DECAGON, a plane geometrical figure of ten sides. A regular decagon is one with equal sides and equal included angles. See Geometry, Vol. X, p. 382.

DECAISNE, Joseph, a French botanist; born at Brussels, Belgium, March 11, 1809; died in Paris, Feb. 10, 1882. He was a specialist in physiological botany. In 1830 he was appointed assistant in the Paris Museum of Natural History. He became director of the Botanical Garden in 1851. He was an untiring worker, and published the results of his investigations in many pamphlets and larger works; among the latter, *History of the Diseases of Potatoes; A Treatise on Systematic Botany;* and various works on rice, yams, etc.

DECAISNEA, a genus of plants of the family *Berberidaceæ*. There is but one species, found in the Himalaya Mountains, where it grows at an elevation of 7,000 feet, and is the only one of the family which is not a climber. From the root project several straight branches, like walking-sticks, bearing pinnate leaves two feet in length, which stand out horizontally. The green flowers, growing in racemes, are unisexual, and the yellow fruit, having a length of about four inches and a diameter of one inch, resembles a short cucumber and contains large black seeds. The soft, milky pulp is sweet and wholesome, and is eaten by the inhabitants of the region.

DECALCOMANIA, the process of transferring designs upon various fabrics. The design is called, in the trade, "decalcomanie." The first use to which this class of work was put was the marking of glass clock-dials, some thirty years ago. An American carriage-painter was the first to use decalcomanie for the ornamentation of vehicles. The superior merit of transfers soon became known to all the trade in any way connected with the use of paints and enamels, until now they are used altogether on carriages, agricultural implements, sewing-machines, bicycles, stoves, safes, scales, typewriters, pianos, refrigerators, iron and wooden machinery, japanned and wooden articles, advertising and window signs, and a score of other articles. The lithograph is made in reverse on prepared paper, and when it is desired to make the transfer, varnish is applied to the face of the decalcomanie and it is firmly pressed upon the article to be decorated. Upon the application of moisture, the chemical preparation joining the design and the paper upon which it is fixed softens,

and the paper is withdrawn, leaving the design permanently transferred. It is then coated with varnish, or, in the case of transferring upon silk, with cement, which renders it water-proof and durable. Many hundreds of thousands of dollars' worth of these transfers are used annually in the United States, where they are now manufactured, but until recently Germany was the only source of supply.

DECALITER. See WEIGHTS AND MEASURES, Vol. XXIV, p. 490.

DE CAMP, JOHN C., an American naval officer; born in New Jersey, Oct. 5, 1812; died in Burlington, New Jersey, June 25, 1875. He entered the naval service in 1827. From that time until the beginning of the Civil War, he was consecutively with the Brazilian, West Indian and African squadrons, stationed at the New York navy-yard, and was commander of the storeship *Relief*. He had advanced from the rank of midshipman to that of commander. During the Civil War he was in the Mississippi squadron (1861–62) in command of the *Iroquois*, and in 1862–65 in the Atlantic squadron. He was afterward stationed at Pensacola and Philadelphia, and was retired in 1870 with the rank of rear-admiral.

DE CANDOLLE, ALPHONSE LOUIS PIERRE PYRAMUS, a Swiss botanist, son of Augustin Pyramus De Candolle (q.v., Vol. VII, p. 18); born in Paris, Oct. 27, 1806; died April 9, 1893. In 1831 he became professor of botany in the Academy of Geneva, but resigned a few years later. He was elected president of the International Botanical Congress at London in 1866, and in the following year of the congress at Paris. He held important offices in several scientific societies. He was decorated with the cross of the Legion of Honor. He published a number of valuable treatises; among them, *Introduction to the Study of Botany* (1835); *Rules for the Nomenclature of Botany* (1867); *History of Science and Scientists* (1872); *The Beginning of Plant Cultivation* (1883); and edited his father's *Elementary Theory of Botany*, and continued his *Introduction to Natural History*.—His son, ANNE CASIMIR PYRAMUS, botanist, was born in Geneva, Feb. 26, 1836. He assisted his father in the *Introduction* and other works, and has written, as the result of his own investigation, *Production of Cork* (1860); *Structure of the Leaves of Dicotyledonous Plants* (1879); and *Recent Investigations of the Piperaceæ* (1882). He was made an honorary doctor of the University of Rostock.

DECAPITATION. See GUILLOTINE, Vol. XI, p. 263; and CAPITAL PUNISHMENT, in these Supplements.

DECAPODA. See MOLLUSCA, Vol. XVI, p. 669.

DECATUR, a village of central northern Alabama, the capital of Morgan County, situated on the Tennessee River, 75 miles N. of Birmingham, on the Louisville and Nashville and Memphis and Charleston railroads. It has an academy, churches, hotels, lumber-mills and a basket factory. Population 1890, 2,765.

DECATUR, a small village of northwestern-central Georgia, the capital of De Kalb County; 5 miles N.E. of Atlanta, on the Georgia and Seaboard Air Line railroads, and is the home of many people who do business in that city. It has schools, churches, a furniture factory, and some agricultural trade. Population 1890, 1,013.

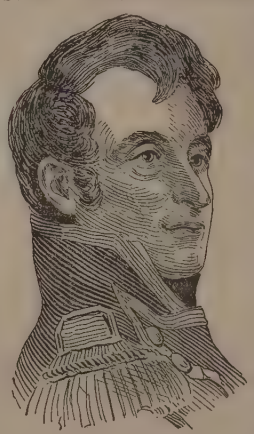
DECATUR, a city of eastern central Illinois, and capital of Macon County (see DECATUR, Vol. VII, p. 18). Decatur has seven lines of railway, a system of water-works, a large woolen mill, three flouring-mills, two breweries, a planing-mill, and manufactories of iron, carriages, engines and boilers, farming implements, furniture, linseed-oil, bagging, etc. It has an excellent system of public schools, a high school, a Roman Catholic academy and a convent. Population 1880, 9,547; 1890, 16,841.

DECATUR, a city and the capital of Adams County, eastern Indiana, 24 miles S.S.E. of Fort Wayne, on Saint Mary's River, and on the Chicago and Erie, Grand Rapids and Indiana and Toledo, St. Louis and Kansas City railroads. It has stone-quarries and a limekiln. Its manufactories are of wind-mills, engines, spokes and hubs, mill machinery and tiling. Population 1890, 1,746.

DECATUR, a village of Van Buren County, southwestern Michigan, 23 miles S.W. of Kalamazoo, on the Michigan Central railroad. It has a foundry, tannery, and manufactures lumber and flour. Population 1895, 1,336.

DECATUR, a village, and the capital of Wise County, northern central Texas, situated 65 miles N.W. of Dallas, on the Fort Worth and Denver City railroad. Flour is here manufactured. Population 1890, 1,746.

DECATUR, STEPHEN, an American naval officer; born in Newport, Rhode Island, in 1751, died in Frankford, near Philadelphia, Nov. 14, 1808. Previous to the Revolution he was in command of a merchant vessel, and during the war commanded successively the privateers *Royal Louis* and *Fair American*. He was one of the boldest and most successful of American privateersmen. In 1798 he commanded the *Delaware*, captured two French ships, and in 1800 was made commander of a fleet of thirteen vessels on the Guadeloupe station. In the following year peace was proclaimed, and he returned and engaged in business in Philadelphia.



STEPHEN DECATUR.

DECATUR, STEPHEN, son of the preceding; born in Sinnepuxent, Maryland, Jan. 5, 1779; died near Bladensburg, Maryland, March 22, 1820. His first voyages were made on board his father's ships. He became a midshipman in 1798, and shipped under

Commodore Barry on the frigate *United States*, on which he saw much service and earned a noble reputation. He served during the naval war with France, and when peace was declared and Congress reduced the navy to six ships and nine commanders, Stephen Decatur was one of the 36 lieutenants retained in the service. When trouble arose with Tripoli, and Commodore Richard Dale was hastily fitted out with a squadron and sent to bring the Tripolitans to terms, Lieutenant Decatur accompanied him as first lieutenant of the *Essex*. The *Essex* was returned to New York, and another expedition sent out under Commodore Preble, who gave Decatur the command of the *Enterprise*. His most conspicuous act while on this expedition was the burning of the *Philadelphia*, an American frigate which had been captured by the Tripolitans and fitted out by them for service. Decatur volunteered for this hazardous task. He entered the harbor of Tripoli, boarded the *Philadelphia*, set fire to her, and then escaped to the *Intrepid* through a rain of shot. "The most daring act of the age," was what Admiral Nelson said of the deed. For this exploit he was made captain. During the war of 1812 Commodore Decatur, commanding the *United States*, captured the British frigate *Macedonian*, and a gold medal was voted him by Congress for the victory. After this war Decatur and Bainbridge were sent with two squadrons to punish the Dey of Algiers, who had been capturing American merchantmen. Commodore Decatur captured the *Mashouda* and *Estedio*, Barbary warships, and made a treaty with Algiers, whereby all Christian captives were to be released without ransom, and no more tribute was to be paid to Algiers. To Tunis and Tripoli somewhat similar terms were dictated, and all Europe rejoiced to see the power of the Barbary states broken. Commodore Decatur's last public services were rendered as naval commissioner. Commodore Barron, who, at the beginning of the War of 1812, had been deprived of his command of the *Chesapeake*, took exceptions to certain remarks which Commodore Decatur made about him. The latter refused to retract, but did all else in his power to restore friendliness, but Barron challenged Decatur. A duel was fought at Bladensburg, March 22, 1820, in which both were wounded, and Decatur died that night.

DECATURVILLE, the county seat of Decatur County, western Tennessee, 50 miles E. of Jackson. It is the seat of a seminary. Its industry is handling the products of the neighborhood, corn, cotton, pork and lumber. Population 1895, nearly 500.

DECAZES, Elie, Duc de, a French jurist and statesman; born at St. Martin-du-Laye, Sept. 28, 1780; died Oct. 24, 1860. He moved to Paris, but was banished in 1814 on account of his loyalty to the Bourbons. He returned in 1815 and was appointed prefect of police. Having the confidence of the king, he was, in 1818, appointed Minister of the Interior and the next year Prime Minister. On account of political intrigues and personal accusations, he was forced to resign in 1820, but was appointed ambassador to London and given the title of duke. He was elected grand referendary of the Chamber of Peers in 1834. After that time he was engaged to some extent in diplomatic missions, but took no active part in political affairs.

DECEIT, a fraudulent misrepresentation by one person, whereby another, who has no means of detecting the fraud, is deceived and suffers injury thereby. An action may be maintained by one person against another, who is chargeable with deceit, to recover the damages he has suffered by reason of the misrepresentation. In an action for deceit it is necessary to show the fraudulent intent, the injury which has resulted from the act, and that the person deceived did not have the means of detecting the fraud. The intent will generally be presumed to be fraudulent if the representation was untrue, and known to be untrue by the party making it, especially if made in response to inquiries by the party to whom the representation was made, or for the apparent purpose of influencing his acts. Actions for deceit are of frequent occurrence in cases where fraudulent representations as to the financial responsibility of another induce the party deceived to extend credit, whereby he sustains a loss. In such cases the party guilty of the fraud must pay the loss. See False Pretenses, in these Supplements.

DECHAMPS, Victor Auguste Isidore, a Belgian cardinal; born at Melle, Belgium, Dec. 6, 1810; died in Mechlin, Sept. 29, 1883. He distinguished himself as a pulpit orator, and in 1865 was consecrated bishop of Namur, and in 1867 archbishop of Mechlin. In 1879 he became a cardinal. He was a leader of the Ultramontanists.

DECIDUOUS TEETH or MILK-TEETH. See Mammalia, Vol. XV, p. 351.

DECIDUOUS TREES, those trees which lose and renew their leaves every year. In cold and temperate countries the fall of leaves in autumn and the restoration of verdure to the woods in spring are among the most familiar phenomena of nature. For deciduous ornamental trees, see Arboriculture, Vol. II, pp. 320, 321.

DECIMATION, a Roman military punishment, rarely inflicted at the present day. When a considerable body of troops committed some grave military offense, which would be punished with death if committed by an individual, the punishment was awarded to one tenth of them by lot, instead of to the whole number, in order that the army might not be too much weakened.

DECIPIUM, a new element discovered by Delafontaine in 1878. Its atomic weight is about 171. It is very rare and little is known about its properties.

DECIUS, Caius Messius Quintus Trajanus, emperor of Rome from A.D. 249 to 251. He was born in Pannonia, at Bubalia, probably about A.D. 200. He was placed at the head of an army by Emperor Philip. The troops under his command

revolted and placed him at their head as emperor. An immediate struggle with Philip took place, and Philip was killed in battle near Verona. The Goths occupied the energies of Decius during the whole of his reign, and he was killed in battle with them. The Christians suffered greatly at his hands.

DECIUS MUS. See Mus, Vol. XVII, p. 64.

DECKER, Sir Matthew, a political economist; born at Amsterdam toward the end of the seventeenth century; died in 1749. In 1702 he went to London and the next year was naturalized as an English subject. Having embarked in commerce, he attained much success. In 1716 he became baronet, three years after which he entered Parliament as member for Bishop's Castle. He is best known among political economists by his theory of a tax on houses, by which all revenue was to be raised. He published, in 1743, a pamphlet on the subject, which attracted much attention. He wrote, also, *Causes of the Decline of the Foreign Trade* (1744); and *Considerations on High Duties* (1743).

DECLARATION, in law, is a technical term referring to the first pleading filed by the plaintiff in a suit at law. It corresponds to the bill in a suit in chancery. It must contain, in proper legal form, a specification of the claim upon which the plaintiff relies, so stated as to apprise the opposite party of the nature of the plaintiff's demand against him. This pleading is sometimes called the complaint, especially in states which have adopted a code of procedure.

The primary meaning of the word is a statement made concerning a transaction by a party thereto, or who has some interest in the transaction. Testimony as to the declarations of a party interested in a transaction or in the fact stated is frequently admitted as evidence. Thus when the fact in question is, whether the declaration was made, evidence of the declaration is admissible. So in cases of the declarations of deceased persons nearly related to the parties in question, as to questions of pedigree. Also as to matters of public or general interest, as in case of reputation. Declarations made by a party against his interest are also original evidence. See also Declaration, Vol. VII, p. 21. As to dying or death-bed declarations, see Evidence, Vol. VIII, p. 741; and Will, Vol. XXIV, p. 573.

DECLARATION OF INDEPENDENCE. The Continental Congress, in session at Philadelphia (for an account of which see United States, Vol. XXIII, p. 741), on July 4, 1776, unanimously adopted the following:

DECLARATION OF INDEPENDENCE.

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume, among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident: that all men are created equal; that they are endowed by their Creator with certain unalienable rights; that among these are life, liberty, and the pursuit of happiness. That, to secure these rights, governments are instituted among men, deriving their just powers from the consent of the governed; that, whenever any form of government becomes destructive of these ends, it is the right of the people to alter or to abolish it, and to institute a new government, laying its foundation on such principles, and organizing its powers in such form, as to them shall seem most likely to effect their safety and happiness. Prudence, indeed, will dictate that governments long established should not be changed for light and transient causes; and, accordingly, all experience hath shown, that mankind are more disposed to suffer, while evils are sufferable, than to right themselves by abolishing the forms to which they are accustomed. But when a long train of abuses and usurpations, pursuing invariably the same object, evinces a design to reduce them under absolute despotism, it is their right, it is their duty, to throw off such government, and to provide new guards for their future security. Such has been the patient sufferance of these colonies, and such is now the necessity which constrains them to alter their former systems of government. The history of the present king of Great Britain is a history of repeated injuries and usurpations, all having, in direct object, the establishment of an absolute tyranny over these states. To prove this, let facts be submitted to a candid world:

He has refused his assent to laws the most wholesome and necessary for the public good.

He has forbidden his governors to pass laws of immediate and pressing importance, unless suspended in their operation till his assent should be obtained; and when so suspended, he has utterly neglected to attend to them.

He has refused to pass other laws for the accommodation of large districts of people, unless those people would relinquish the right of representation in the legislature,—a right inestimable to them, and formidable to tyrants only.

He has called together legislative bodies at places unusual, uncomfortable, and distant from the depository of their public records, for the sole purpose of fatiguing them into compliance with his measures.

He has dissolved representative houses repeatedly, for opposing, with manly firmness, his invasions on the rights of the people.

He has refused, for a long time after such dissolutions, to cause others to be elected; whereby the legislative powers, incapable of annihilation, have returned to the people at large for their exercise; the state remaining, in the mean time, exposed to all the danger of invasion from without and convulsions within.

He has endeavored to prevent the population of these states; for that purpose obstructing the laws for naturalization of foreigners; refusing to pass others to encourage their migration hither, and raising the conditions of new appropriations of lands.

He has obstructed the administration of justice, by refusing his assent to laws for establishing judiciary powers.

He has made judges dependent on his will alone for the tenure of their offices, and the amount and payment of their salaries.

He has erected a multitude of new offices, and sent hither swarms of officers to harass our people and eat out their substance.

He has kept among us, in times of peace, standing armies, without the consent of our legislature.

He has affected to render the military independent of and superior to the civil power.

He has combined, with others, to subject us to a jurisdiction foreign to our constitution, and unacknowledged by our laws; giving his assent to their acts of pretended legislation:

For quartering large bodies of armed troops among us;

For protecting them, by a mock trial, from punishment for any murders which they should commit on the inhabitants of these states;

For cutting off our trade with all parts of the world;

For imposing taxes on us without our consent;

For depriving us, in many cases, of the benefits of trial by jury;

For transporting us beyond seas to be tried for pretended offenses;

For abolishing the free system of English laws in a neighboring province, establishing therein an arbitrary government, and enlarging its boundaries, so as to render it at once an example and fit instrument for introducing the same absolute rule into these colonies;

For taking away our charters, abolishing our most valuable laws, and altering, fundamentally, the powers of our governments;

For suspending our own legislatures, and declaring themselves invested with power to legislate for us in all cases whatsoever.

He has abdicated government here, by declaring us out of his protection, and waging war against us.

He has plundered our seas, ravaged our coasts, burnt our towns, and destroyed the lives of our people.

He is, at this time, transporting large armies of foreign mercenaries to complete the works of death, desolation, and tyranny already begun, with circumstances of cruelty and perfidy scarcely paralleled in the most barbarous ages, and totally unworthy the head of a civilized nation.

He has constrained our fellow-citizens, taken captive on the high seas, to bear arms against their country, to become the executioners of their friends and brethren, or to fall themselves by their hands.

He has excited domestic insurrections amongst us, and has endeavored to bring on the inhabitants of our frontiers the merciless Indian savages, whose known rule of warfare is an undistinguished destruction of all ages, sexes and conditions.

In every stage of these oppressions we have petitioned for redress, in the most humble terms; our repeated petitions have been answered only by repeated injury. A prince whose character is thus marked by every act which may define a tyrant is unfit to be the ruler of a free people.

Nor have we been wanting in attention to our British brethren. We have warned them, from time to time, of attempts made by their legislature to extend an unwarrantable jurisdiction over us. We have reminded them of the circumstances of our emigration and settlement here. We have appealed to their native justice and magnanimity, and we have conjured them, by the ties of our common kindred, to disavow these usurpations, which would inevitably interrupt our connections and correspondence. They, too, have been deaf to the voice of justice and consanguinity. We must, therefore, acquiesce in the necessity which denounces our separation, and hold them, as we hold the rest of mankind, enemies in war,—in peace, friends.

We, therefore, the representatives of the United States of America, in General Congress assembled, appealing to the Supreme Judge of the World for the rectitude of our intentions, do, in the name and by the authority of the good people of these colonies, solemnly publish and declare, that these United Colonies are, and of right ought to be, free and independent states; that they are absolved from all allegiance to the British crown, and that all political connection between them and the state of Great Britain is, and ought to be, totally dissolved; and that, as free and independent states, they have full power to levy war, conclude peace, contract alliances, establish commerce, and to do all other acts and things which independent states may of right do. And, for the support of this declaration, with a firm reliance on the protection of Divine Providence, we mutually pledge to each other our lives, our fortunes and our sacred honor.

The Declaration was signed as follows:

New Hampshire.
JOSIAH BARTLETT.
WILLIAM WHIPPLE.
MATTHEW THORNTON.

Rhode Island.
STEPHEN HOPKINS.
WILLIAM ELLERY.

Massachusetts.
JOHN HANCOCK.
SAMUEL ADAMS.
JOHN ADAMS.
ROBERT TREAT PAINE.
ELBRIDGE GERRY.

Connecticut.
ROGER SHERMAN.
SAMUEL HUNTINGTON.
WILLIAM WILLIAMS.
OLIVER WOLCOTT.

New York.
WILLIAM FLOYD.
PHILIP LIVINGSTON.
FRANCIS LEWIS.
LEWIS MORRIS.

New Jersey.
RICHARD STOCKTON.
JOHN WITHERSPOON.
FRANCIS HOPKINSON.
JOHN HART.
ABRAHAM CLARK.

Pennsylvania.
ROBERT MORRIS.
BENJAMIN RUSH.
BENJAMIN FRANKLIN.
JOHN MORTON.
GEORGE CLYMER.
JAMES SMITH.
GEORGE TAYLOR.
JAMES WILSON.
GEORGE ROSS.

Delaware.
CÆSAR RODNEY.
GEORGE READ.
THOMAS MCKEAN.

Maryland.
SAMUEL CHASE.
WILLIAM PACA.
THOMAS STONE.
CHARLES CARROLL of Carrollton.

Virginia.
GEORGE WYTHE.
RICHARD HENRY LEE.
THOMAS JEFFERSON.
BENJAMIN HARRISON.
THOMAS NELSON, JR.
FRANCIS LIGHTFOOT LEE.
CARTER BRAXTON.

North Carolina.
WILLIAM HOOPER.
JOSEPH HEWES.
JOHN PENN.

South Carolina.
EDWARD RUTLEDGE.
THOMAS HEYWARD, JR.
THOMAS LYNCH, JR.
ARTHUR MIDDLETON.

Georgia.
BUTTON GWINNETT.
LYMAN HALL.
GEORGE WALTON.

DECLARATION OF INDULGENCE. See ENGLAND, Vol. VIII, p. 349.

DECLARATION OF RIGHTS. See BILL OF RIGHTS, Vol. XX, p. 555

DECLARATION OF WAR, a formal announcement of the beginning of hostilities between two states. It was the custom of the Romans to issue some formal declaration acquainting the citizens of Rome with the commencement of war. Later, in the days of feudalism and knighthood, it was the practice to send a herald to the state upon which war was to be made, who made an oral declaration of the reasons for the war and of its immediate beginning. In modern times, before the invention of the telegraph and the construction of the railroad, ample notice was given not only to the enemy, but also to the neutrals engaged in commerce with the belligerents. It is now no longer customary to send the enemy a formal announcement, but notice is given neutral states, and the citizens of the governments about to engage in war are notified by their own governments. The need of such declaration no longer exists, owing to the telegraph and other modern inventions. The power of declaring war rests, in the United States, with Congress.

DECLINATION. See ASTRONOMY, Vol. II, p. 765.

DECLINATION NEEDLE, a magnetic needle which, when suspended or made to rest on a point so that it can move in a horizontal plane, rests in a line connecting two fixed points of the horizon; to which position, when turned aside in any direction, it invariably returns after several oscillations. These two points at certain places on the globe are the north and south points of the horizon, although there is usually a slight deviation from these points. A magnetic meridian is the vertical plane passing through the points on the horizon indicated by the needle; and a similar plane, passing through the north and south points, is called the astronomical meridian of the place. See MAGNETISM, Vol. XV, pp. 220, 238.

DECLINOMETER. See METEOROLOGY, Vol. XVI, pp. 161, 162.

DECOLORIMETER, an instrument by which the power of portions of bone-black, or animal charcoal, to abstract coloring matter is ascertained; a measurer of the effects of bleaching-powder. It is a graduated tube charged with a test-solution of indigo or molasses.

DECOMPOSITION, a term in chemistry signifying the separation of more simple substances from a compound. Thus the red oxide of mercury, when heated, resolves into mercury and oxygen, thus undergoing decomposition; and water under a current of voltaic electricity is decomposed into hydrogen and oxygen. See *Chemical Action*, under CHEMISTRY, Vol. V, p. 474.

DE CONINCK, PIERRE LOUIS JOSEPH, a French artist; born at Méteren, France, Nov. 22, 1828. He studied under Leon Cogniet. He exhibited at Rome in 1855, and at the Paris Salon in 1857. He obtained medals in the Salons of 1866, 1868, 1875, and at the Universal Exposition of 1889, and was made a chevalier of the Legion of Honor. Among his paintings are *Moccoli*: *The End of the Carnival at Rome* (1877); *Portrait of a Trappist* (1885); *Cornelia* (1878); and *The Gardener* (1889).

DECORAH, a city, the county seat of Winneshiek County, northeastern Iowa, on the Upper Iowa River; the seat of the Norwegian Luther College; contains churches, banks, mills and newspaper-offices. Three Norwegian periodicals are published here. Population 1895, 3,141.

DECORATED STYLE. See (ENGLISH GOTHIC) ARCHITECTURE, Vol. II, pp. 425–428.

DECORATION DAY, sometimes called Memorial day, is the day set apart in the United States for commemorating the services of the soldiers and sailors who lost their lives in the Civil War. Orations and processions are made in their honor, and their graves are florally decorated. It is observed by North and South alike, and, in most of the states of the Union, on the same day—May 30th.

DECORATIVE ART. See MURAL DECORATION, Vol. XVII, p. 34; POTTERY, Vol. XIX, pp. 611–625; JAPAN, Vol. XIII, pp. 588–592.

DE COSTA, BENJAMIN FRANKLIN, an American Protestant Episcopal clergyman; born July 10, 1831, in Charlestown, Massachusetts; now (1896) rector of the Church of St. John the Evangelist, in New York City. He entered the ministry in 1857, after being graduated at the Concord, New Hampshire, Biblical Institute. From 1857 to 1860 he was rector, first at North Adams, and later at Newton Lower Falls. For the first three years of the Civil War he was a chaplain in the Massachusetts infantry. He left the army in 1863 and engaged in journalism on the editorial staff of the *Christian Times*, the *Episcopalian* and the *Magazine of American History*. He published *Pre-Columbian Discovery of America by the Northmen* (1869); *The Moabite Stone* (1870); and *The Rector of Roxburgh* (1873); etc. He was active in the organization of temperance societies, and became prominent member of the Huguenot Society of America.

DECREPITATION, a term applied to the crackling sound heard when a substance like common salt is thrown into the fire. A series of minute explosions occurs, owing to the water between the plates of the crystalline particles becoming expanded by the heat, and ultimately bursting them.

DECRESCENDO, in music, the reverse of crescendo; namely, gradual diminishing of the sound. The execution of the decrescendo is very difficult, whether on one or more notes. Like the crescendo, it is also frequently combined with a slight ritardando, especially in descending passages. It is indicated by *dec.* or *decres.*, or by the mark >.

DECRETALS, FALSE, a collection of papal letters, canons, etc., chiefly forgeries, ascribed to Isidorus Mercator, and dating from the first half of the ninth century. See CANON LAW, Vol. V, p. 17.

DECUSSATION, the crossing of two nerves, rays or lines which meet in a point and then diverge. For *Decussation of the Pyramids*, see ANATOMY, Vol. I, p. 870.

DEDHAM, a manufacturing town of central eastern Massachusetts, ten miles S.W. of Boston, the capital of Norfolk County, situated on the Charles River, and on the New York, New Haven and Hartford and New England railroads. It manufactures brooms, woolen goods and pianos; has good public buildings, a courthouse, jail and house of correction, a town hall, and also a home for fallen women. Population 1890, 2,500.

DEDICATION, in law, is the act of setting apart land for some public use by the owner, and which the public, or the proper officer on its behalf, accepts for such uses. Thus when the owner lays out and plats a tract of land and devotes certain portions thereof to public streets and alleys, and the public, through its proper officers, accepts the same, this act constitutes a dedication and precludes the owner from exercising control over it. Dedication may be either express, as when made by deed or other formal or direct manner, or it may be implied from the acts of the owner, as when he acquiesces in the use by the public under circumstances which indicate that he intended a dedication.

DE DONIS CONDITIONALIBUS, THE STATUTE, a law passed in England, A.D. 1285, the object of which was to prevent the alienation of property by one who held a limited interest therein. Similar statutes are now enforced in many of the United States.

DEDUCTION. See A PRIORI, Vol. II, p. 214.

DEEMS, CHARLES FORCE, an American clergyman and educator; born in Baltimore, Maryland, Dec. 4, 1820; died Nov. 18, 1893, in New York City. After his graduation at Dickinson College in 1839, he entered the Methodist Episcopal ministry and was engaged in active pastoral work until 1842, when he was appointed professor of logic in the University of North Carolina; in 1845 became professor of chemistry in Randolph-Macon College, and in 1850–55

president of Greensboro Female College. He returned to his pastoral work in New York City, and remained there until the time of his death as pastor of the Church of Strangers. He was a close intimate of Cornelius Vanderbilt, and was largely responsible for the establishment and endowment of Vanderbilt University, Tennessee. He was a ready writer, and published a number of valuable works; among them, *Triumph of Peace, and Other Poems* (1840); *Weight and Wings* (1872); and *Chips and Chunks for Every Fireside* (1892). He edited *The Southern Methodist Episcopal Pulpit* (1846–51); *The Annals of Southern Methodism* (1849–52); and *Frank Leslie's Sunday Magazine* (1876–79).

DEEMSTER. See MAN, ISLE OF, Vol. XV, p. 452.

DEEP BOTTOM, a point on the James River, in Henrico County, eastern Virginia, 12 miles below Richmond. It was a strategic point during the Civil War, and important battles were fought in the vicinity in the year 1864.

DEEP RIVER, a village of Middlesex County, central southern Connecticut, situated near the west bank of the Connecticut River, about 35 miles S. of Hartford, on the New York, New Haven and Hartford railroad. The chief industry is the manufacturing of hardware. Population 1890, 1,297.

DEEP RIVER, of North Carolina, rises in Guilford County, follows a southeasterly course and unites with Haw River at Haywood, to form the Cape Fear River. Deep River is about 130 miles long. In Chatham and Moore counties are found the Deep River coal-beds, a tract of land containing about 40 square miles, lying along the Deep River valley. The coal is of good quality, varying from bituminous to anthracite. Although the coal is abundant, and its location known for over a century, it has not been mined. In the same region good copper and iron ores are found.

DEEP–SEA EXPLORATION. See DREDGE, Vol. VII, pp. 461 et seq.

DEERFIELD, a historic village in Franklin County, northwestern Massachusetts, on the Boston and Maine and New York, New Haven and Hartford railroads. In 1675 it was the scene of "Bloody Brook massacre," and in 1703 the French and Indians burned the village. It is a railroad center, and possesses many attractions of scenery for the tourist. Population 1890, 2,910.

DEE RIVER. See CHESHIRE, Vol. V, p. 589.

DEER LODGE CITY, the capital of Deer Lodge County, western Montana, situated on a creek of the same name, on the Montana Union railroad, about 50 miles S.W. of Helena. The region is mountainous, and gold is found. Population 1890, 1,463.

DEER–MOUSE OR JUMPING–MOUSE, a genus of American rodent quadrupeds, allied to mice and to jerboas. See JERBOA, Vol. XIII, p. 626.

DEER PARK, a township of Orange County, southern New York, drained by the Neversink River and intersected by the New York, Lake Erie and Western railroad. The Delaware River bounds it on the southwest.

DEER, VIRGINIA. See CARIACOU, in these Supplements.

DE FACTO, a legal term used to denote a condition actually existing, or a thing which has been done. It is frequently used in contradistinction to *de jure*, which means, of right. Thus an officer *de facto* is one who in fact exercises the functions of the office with apparent right, but who is not actually qualified in law as such officer. A *de facto* government is one completely established, and actually exercising control, but whose control is not recognized as permanent or rightful.

DEFAULT, in law, is the failure of the defendant in a suit to appear in proper time and make his defense, or of the plaintiff to prosecute his claim against the defendant. Upon default of the defendant, judgment by default may be rendered against him, in accordance with the claim set forth in the declaration. Upon default of the plaintiff, a nonsuit may be entered against him. Usually, in suits to recover a definite liquidated sum of money, a judgment may be entered against the defendant upon his default in pleading to the action without the hearing of proofs, provided the plaintiff has filed with his declaration an affidavit of the amount due him. Default, in its general sense, means the failure of a party to perform a duty or undertaking.

DEFEASANCE, a collateral instrument, usually made at the same time or in connection with the same transaction as another conveyance, and which contains conditions which, if performed, will defeat the estate created by the other deed. Thus a bond for the reconveyance of an estate upon the payment of a certain sum at a specified time, and delivered at the same time the estate is conveyed, is a defeasance, and if the condition is performed by the payment of the money at the time agreed, the deed of conveyance will be defeated. An instrument of defeasance must be of as high a nature as the principal deed, and must be recorded, to be binding as against a stranger without notice.

DEFENDER OF THE MARRIAGE TIE, an office created by Pope Benedict XIV in 1741. Its object is, in all cases of actions for divorce, or any attempt to annul the marriage tie, to defend the sanctity of the marriage bond in every feature of its integrity. Marriage, being a sacrament in the Catholic Church, is, like the other sacraments, most jealously guarded. The "defender," or officer appointed to defend, is clothed by ecclesiastical authority with the same, or similar, powers that the prosecuting attorney has in civil law in criminal procedure. It is his duty to protect and defend the sacredness of the marriage tie in every case presented within his jurisdiction. He usually acts as a referee in civil court procedure. The office was instituted in America by the Third Plenary Council in 1884, and is now extended until each Catholic diocese has its own "defender" ecclesiastically

appointed. The first appointment in the United States, resultant on the action of the Baltimore Council in 1884, was the Rev. Dr. Burtsell, who was made "defender," etc., by Archbishop Corrigan, and elected by the synod of 1886.

DEFENSE, the resistance of an attack. Self-defense, in case of an attack with force, when the person attacked cannot otherwise avoid injury, is a natural right which the law recognizes. A man is also permitted to repel force by force for the purpose of protecting his family and property. If one kills an assailant while protecting himself, his family, or even his property, and while using only means proportionate to the occasion, he will be justified, provided the act from which he attempts protection would if carried out, constitute a felony.

DEFIANCE, capital of Defiance County, northwestern Ohio, on the Maumee River, where it is joined by the Tiffin, about 50 miles S.W. of Toledo, and about 44 miles N.E. of Fort Wayne, Indiana. It is on the Wabash railroad, the Wabash and Erie canal, and the Baltimore, Pittsburgh and Chicago railroad. It publishes two weekly newspapers, and contains a seminary for women, and several manufactories. Population 1890, 7,694.

DEFLAGRATION, a sharp, quick combustion; an example is the rapid combustion of ignited charcoal, where a nitrate, such as nitrate of potash, or a chlorate, such as chlorate of potash, is thrown thereon. As chlorates do not occur naturally, it follows that deflagration with a natural salt indicates a nitrate; and if the deflagration be accompanied by a violet flame, it is characteristic of nitrate of potash (ordinary niter or saltpeter); and if by a strong yellow flame, it is indicative of a nitrate of soda (cubical niter).

DEFORCEMENT, in English law, an abatement, intrusion, disseisin or discontinuance, or any other wrong whatsoever, whereby he that has the right to the freehold is kept out of possession.

DE FOREST, John William, an American soldier and author; born in Humphreysville (now Seymour), Connecticut, March 31, 1826. His education was largely obtained abroad. During the Civil War he served as captain of volunteers, quitting the service with the rank of major. Before the war he had written several books, and stories for periodicals, and being on the field of operations, he sent to *Harper's Monthly*, descriptions of many battles fought in Louisiana and Georgia. He wrote many essays, poems and some fifty short stories. Among his writings are *Oriental Acquaintance* (1856); *Seacliff*, a novel (1859); *Honest John Vane* (1875); and *The Oddest of Courtships; or, The Bloody Chasm* (1881).

DEFREGGER, Franz, a German painter; born in Tyrol, at Stronack, April 30, 1835. He studied in Munich and Paris, and was a pupil of Piloty, becoming one of the foremost *genre* painters. His pictures are for the most part from Tyrolese life. The more famous among them are *Tyrolese Landsturm Returning from the War of 1809; The Prize Horse;* and *The Wrestlers.* A member of the Munich Academy, he has his studio in that city.

DE FUNIAC SPRINGS, a village of western Florida, capital of Walton County, about twenty miles N. of Choctawhatchee Bay, on the Louisville and Nashville railroad. It is the seat of the Florida Chautauqua and state normal school.

DEGENERATION, Animal. See Zoölogy, Vol. XXIV, p. 811. In Plants. See Botany, Vol. IV, pp. 128, 129.

DEGER, Ernst, a German historical painter; born at Bockenheim, April 15, 1809; died Jan. 27, 1885, at Düsseldorf. He was a pupil of Schadow at the Düsseldorf Academy. The greater part of his work was in Scriptural illustration, especially in church decoration, notedly at the Church of St. Apollinaris at Remagen, and the Chateau at Stolzenfels. He was one of the group of artists known as "Nazarites," and was a member of the Munich and Berlin academies.

DE GIERS, Nicholas Carlovitch, a Russian statesman; born at Radzivilow, May 9, 1820; died in St. Petersburg, Jan. 26, 1895. He entered the diplomatic service in 1838; was in the foreign office during the Crimean War; consul-general to Egypt, Wallachia and Moldavia; minister to Teheran; was next made privy councilor; minister to Switzerland and Sweden. In 1875 he was appointed adjunct minister of foreign affairs, and in 1882 succeeded Gortchakoff as the head of the department of foreign affairs.

DE GOEJE, Michael Jan, a Dutch Orientalist; born in Dronryp, Aug. 13, 1836. He began the study of Arabic under the tuition of his father, and afterward under the famous Arabist, Dosy, professor at the University of Leyden. He himself was appointed, in 1869, professor of Arabic at the University of Leyden. He has published numerous new editions of Arabic texts, with translations and glossaries. Among these may be mentioned *Jakubi*, a description of Africa and Spain; *Belâdhori*, a history of the conquest of Syria; and a series of historical and geographical notes on the Orient.

DEGOLLADO, Santos, a Mexican general; born in Morelia, Mexico, July 30, 1819; died in June, 1861. In 1854 he took part in the revolt against Santa Anna, and raised an army of two thousand men, who joined the forces under the command of General Juan Alvarez. This general, at the head of the Liberal forces, deposed Santa Anna, and became President, while Degollado, belonging to the Liberal party, and opposed to the church party, devoted his energies to the establishment of the government. He was elected governor of his native state, Michoacan, in 1859, and then elected to Congress. In the mean time the church party had become powerful and aggressive; it had sent an army into the field, and now threatened the government. Its latest outrage was the capture and unprovoked assassination of Melchor Ocampo, the friend of Degollado. The latter asked permission to lead an expedition against the rebels. He started out with 150 men, fell into an ambush and was assassinated.

DEGREE, in music, the difference of position or elevation of the notes on the lines and spaces. When notes are on the same line or space they are on the same degree, even though one of the notes should be raised by a sharp or lowered by a flat. When two notes follow diatonically, so that one of them is on a line and the other on a space adjoining, the interval is of one degree. Subtracting one from an interval gives the degrees which separate the two notes; thus a third is separated by two degrees, a fourth by three, etc.

DEGREES, ACADEMICAL. See EXAMINATIONS, Vol. VIII, p. 777.

DE HAAS, WILLIAM FREDERICK, marine-painter; born in Rotterdam, Holland, in 1830; died in Fayal, Azores, July 16, 1880. He studied in his native city and under Bosboom, at The Hague. He emigrated to America in 1854. His works include *Sunrise on the Susquehanna; Fishing-Boats off Mt. Desert; Boon Island; Coast of Maine;* and *Narragansett Pier.*

DE HAAS, MAURICE FREDERICK HENDRICK, a Dutch-American marine-painter; born in Rotterdam, Holland, in 1832, the brother of William F. De Haas. He studied art in his native country, made sketches of Dutch and English coasts, and was appointed artist of the Dutch navy. In 1859 he came to New York, where he became an associate of the National Academy and one of the original members of the American Water-Colors Society. Among his works are *Storm off the Isle of Jersey; After the Wreck; Off the Coast of France; Sunset at Sea; Drifting Ashore in a Fog; Early Morning off the Coast;* and *Farragut Passing the Forts.* Died in New York, Nov. 23, 1895.

DE HAVEN, EDWIN J., an American Arctic explorer; born in Philadelphia, Pennsylvania, in 1819; died there, Oct. 2, 1865. At the age of ten he entered the marine service, continuing in it for thirty-six years. From 1839 to 1842 he was with Wilkes's exploring expedition, and for sixteen months he was in command of the first expedition sent by Henry Grinnell in search of Sir John Franklin.

DEIANIRA, daughter of Œneus; she poisoned the tunic of Hercules with blood of the centaur Nessus, preserved under the impression of its being a love-charm. See HERCULES, Vol. XI, p. 726.

DEI GRATIA (Lat., "by the favor of God,") a formula taken from several apostolical expressions in the New Testament. It is believed to have been first formally used by the bishops at the Council of Ephesus, A.D. 431. Afterward it came to be appended by archbishops, bishops, abbots, abbesses, deans, monks, and even chaplains, to their titles, in letters and other documents, as an humble expression of dependence on the Most High. After the middle of the thirteenth century, the higher clergy wrote *Dei et Apostolicæ Sedis gratia,* "By the favor of God and the Apostolic See." In the British Islands this style was generally dropped about the time of the Reformation, but it was occasionally given to the archbishops of Canterbury and York, even after the beginning of the seventeenth century. It has also been used by monarchs, having in their minds a special significance as expressing the idea of the "divine right of kings."

DEJAZET, PAULINE VIRGINIE, a French actress, from whom the Théâtre Dejazet, in Paris, receives its name; born, Aug. 30, 1797, in Paris; died there, Dec. 1, 1875. She began her stage-life while a child, and remained active in the profession for over seventy-five years. She was extremely popular while in her prime. At the time of her death she owned the Théâtre Dejazet.

DE KALB, a city in the northern part of Illinois, the capital of De Kalb County, about 60 miles W. of Chicago, on the Chicago Great Western and Chicago and North-Western railroads. It has manufactories of plows and other farming tools, furniture, gloves, mittens, barbed wire, iron wire, shoes and machinery. Population 1880, 1,598; 1890, 2,579. The increase was due to the location of several large new factories in the city.

DE KALB, JOHN, BARON, a Bavarian general who entered the French army, and, accompanying Lafayette to America, fought under Washington and Gates; born July 29, 1721, in Hüttendorf, Bavaria; killed in battle at Camden, South Carolina, Aug. 19, 1780. He was induced by Silas Deane to join the American forces, and upon his arrival in America was made a major-general by Congress. He was under Washington at Valley Forge and in New Jersey until 1780, when he was sent to aid General Gates in the South. He was mortally wounded, Aug. 16, 1780, while heading his forces in resisting an attack by Cornwallis. A statue has been erected to his memory in Annapolis, Maryland.

DE KAY, CHARLES, an American novelist and journalist; born July 25, 1848, at Washington, District of Columbia, a grandson of the poet, Joseph Rodman Drake. He became literary editor of the New York *Times* in 1877, and held that position until 1894, when he was appointed United States consul to Berlin. He has published *The Bohemian* (1878); *Hesperus*, and Other Poems (1880); *Love Poems of Louis Barnaval* (1883); and *Barye: Life and Works* (1889).

DE KAY, JAMES ELLSWORTH, an American naturalist; born in Lisbon, Portugal, in 1792; died in Oyster Bay, Long Island, New York, Nov. 21, 1851. He studied for the medical profession in Edinburgh; visited Turkey with his father-in-law, Henry Eckford; was sent by the latter on business connected with the navy to the South American countries, and on his return settled at Oyster Bay. During the cholera outbreak in New York he gave his services to the victims. He wrote for the press, was engaged in a state survey, the departments of botany and zoölogy being assigned him. His researches are in five volumes of the *New York State Survey* (1842–49). He also published *Travels in Turkey* (1833).

DEKKER, EDWARD DOUWES, a Dutch author; born in Amsterdam, March 2, 1820; died in Nieder-Ingelheim, Feb. 19, 1887. He published two

dramas, several works on the Dutch Indies, and various other popular books, the best known being *Max Havelar* (1860). He wrote under the pseudonym "Multatuli."

DE KOVEN, James, an American clergyman; born in Middletown, Connecticut, Sept. 19, 1831; died in Racine, Wisconsin, March 9, 1879. He was a graduate of Columbia and the General Theological Seminary, and was made rector at Delafield, Wisconsin, of the Church of St. John Chrysostom. The care of the school, St. John's Hall, was placed in his hands, and in 1859 he was elected warden of Racine College, and introduced various innovations, such as the wearing of the Oxford cap and gown by teachers and pupils, and the first surpliced choir west of New York. He did much for the upbuilding of this college, by the extension of its grounds and the erection of a new chapel and other buildings. He declined the call to be the assistant rector of Trinity Church, New York, and a little while before his death he was chosen rector of St. Mark's, Philadelphia. He was a brilliant conversationalist and a powerful pulpit orator.

DE KOVEN, Reginald, an American musical composer; born in Middletown, Connecticut, April 30, 1859. After several years spent in study at Stuttgart under Speidl, and at Paris under Mathias and Durand, he attended King's College, Oxford, and was graduated in 1879. He again went to Stuttgart and studied under Lebert and Pruchner. His original idea had been to become a professional pianist, but he gave this up and devoted himself to composition, in which he took a front rank among opera and song writers. His first composition was a song, *Margery Daw* (1882). He afterward published over one hundred songs; among them, *Oh, Promise Me; Winter's Lullaby; Indian Love Song; Ask What Thou Wilt;* etc. But it is perhaps for his operas that Mr. De Koven is best known. Among them are *Robin Hood* (1890); *Don Quixote* (1889); *The Fencing-Master* (1892); *Rob Roy* (1894); and *The Mandarin* (1896). He became musical critic for the New York *World*.

DE KROYFT, Sarah Helen Aldrich, an American authoress; born at Rochester, New York, Oct. 29, 1818. She received an excellent education, and graduated at the Lima Seminary, in New York. In 1845 she was married, but her husband was accidentally killed on the wedding day. Later she became totally blind, but nevertheless became a successful writer for the periodicals. She has lectured on *Darwin and Moses*. Her only published book is *A Place in Thy Memory* (1850).

DELABORDE, Henri, a French historical painter; born at Rennes, May 2, 1811; a pupil of Delaroche; a member of the Institute, an officer of the Legion of Honor, and perpetual secretary of the Academy of Fine Arts, and gained a high reputation as a writer and art critic. Among his paintings are *The Confessions of St. Augustine* (1853); *The Death of St. Monica* (1838); and *The Taking of Damietta* (1841). He contributed to the *Revue des Deux Mondes*, and his published works include *Studies of the Fine Arts in France and Italy* (1864); *The Collections of Engravings in the National Library* (1875); and *A Compendium of the Origin, History and Processes of Engraving* (1882).

DELAFIELD, Edward, an American physician and surgeon; born at New York, May 17, 1812; died there, Feb. 13, 1875. He graduated at Yale in 1812, and studied medicine in New York, London and Paris. He assisted in founding the New York Eye and Ear Infirmary in 1820, and the New York Ophthalmological Society in 1865, of which he afterward became president; and was president of Roosevelt Hospital and of the New York College of Physicians and Surgeons at the time of his death.—His son, Francis Delafield, was born in New York, Aug. 13, 1841; educated at Yale and in the New York College of Physicians and Surgeons. He has been surgeon in the New York Eye and Ear Infirmary, physician to Bellevue Hospital, professor of pathology and practical medicine in the New York College of Physicians and Surgeons, and, among other medical works, has published a *Handbook of Post-Mortem Examination* (1872) and *Handbook of Pathological Anatomy* (1885).

DELAFIELD, Richard, an American military engineer; born in New York City, Sept. 1, 1798; died in Washington, District of Columbia, Nov. 5, 1873. After graduating at West Point in 1818 he became a military engineer, and was appointed to duty on the northern boundary survey of the United States, under the Ghent treaty. Subsequently he was employed on the defenses of Hampton Roads, the Mississippi, Delaware and Hudson rivers. He was twice superintendent of West Point. He was one of the military commission sent to Europe in 1855, during the Crimean War, to study the warfare of the times. From 1861 to 1863 he served on the staff of Governor Morgan of New York; from 1864 to 1866 had charge of the bureau of engineers of the War Department, was inspector of the Military Academy, and in 1866 was retired from service with the rank of brigadier-general.

DELAGOA BAY. For over half a century there have been intermittent attempts to establish communication between the Transvaal and Delagoa Bay. All failed, however, till 1887, when a company was formed in London to work a concession from the Portuguese government for the construction of a railway from Delagoa Bay to the Transvaal frontier. The line was partly opened in 1888, and in July, 1895, was finished to Pretoria, in the Transvaal, a distance of 350 miles, and to Johannesburg, four hundred miles from the bay. See Delagoa Bay, Vol. VII, p. 40.

DE LANCEY, James, an American jurist; born in New York City, Nov. 27, 1703; died there, July 30, 1760. He was educated in England, where he studied law. He took a prominent part in the early organization of the city of New York, and was mainly responsible for the "Montgomery Charter" of 1730. He became chief justice of the

supreme court in New York in 1733, lieutenant-governor of the state, presided over the first Congress held in the colonies, and was the first person on whom the freedom of the city of New York was conferred. He was one of the founders of King's College. The De Lancey family was prominent in Revolutionary times, and several of its members were men of remarkable talent.

DE LANCEY, WILLIAM HEATHCOTE, an American Protestant Episcopal bishop, nephew of the preceding; born Oct. 8, 1797, in Mamaroneck, New York; died in Geneva, New York, April 5, 1865. He was ordained deacon in 1819, and priest in 1822. From 1828 to 1833 he was provost of the University of Pennsylvania. In 1835 he became rector of St. Peter's Church, Philadelphia, having been assistant for the two previous years. He was chosen bishop of western New York in 1839, and in 1852 was a delegate to the one hundred and fiftieth anniversary of the London Missionary Society, this being the first occasion on which the American church was formally represented in England.

DELAND, a city and the capital of Volusia County, central eastern Florida, 41 miles N.W. of Titusville, on a branch of the Jacksonville, Tampa and Key West railroad. It is the seat of Stetson University. It is also popular as a health-resort. Its industries are machine-shops, refrigerator factories and the handling of the great quantities of oranges raised in the vicinity. Population 1890, 1,113.

DELAND, MARGARETTA WADE (CAMPBELL), an American novelist and poet; born Feb. 23, 1857, in Allegheny, Pennsylvania. Her school days were spent at the Pelham Priory, in New Rochelle, New York, and at Cooper Union, New York City. Upon the completion of her studies she engaged in teaching. She has written a number of delightful poems and novels, including *The Old Garden and Other Verses* (1886); *John Ward, Preacher* (1888); *Philip and His Wife* (1894); *Sidney* (1890); and *Old Chester Tales* (1898). She was married to Lorin F. Deland of Boston in 1880.

MARGARET W. DELAND.

DELANE, JOHN THADEUS, a British editor; born in London, Oct. 11, 1817; died there, Nov. 22, 1879. He was graduated at Oxford in 1839. He made starts in several professions, and finally drifted into journalism. He became a member of the staff of the London *Times*, and in 1841 its editor. His connection with that paper and his influence are given under NEWSPAPERS, Vol. XVII, p. 418.

DELANO, COLUMBUS, an American statesman; born in Shoreham, Vermont, June 5, 1809. He became an eminent criminal lawyer in Ohio, was elected to the legislature and to Congress in 1844, 1864 and 1866. He was a delegate to the conventions of 1860 and 1864 which nominated Abraham Lincoln to the Presidency. President Grant appointed him Commissioner of Internal Revenue in 1869. From 1870 to 1875 he was Secretary of the Interior. He died at his home near Mount Vernon, Ohio, Oct. 23, 1896.

DE LA RAMÉE, LOUISE ("Ouida"), an English novelist; born in 1840, at Bury St. Edmunds, England. She began at a very early age to write for the London periodicals, especially Colburn's *New Monthly Magazine*. The childish mispronunciation of her name, Louisa, suggested her pseudonym, "Ouida." Since gaining a reputation she has spent the greater part of her time in Italy. She was a very prolific writer; over 25 novels are accredited to her. Her best-known works are *Strathmore* (1865); *Under Two Flags* (1867); *Pascarel* (1873); *Two Little Wooden Shoes* (1874); and *Moths* (1880).

LOUISE DE LA RAMÉE.

DELATOR, an informer or accuser. The original use of the term was for any kind of a carrier, but soon it was applied only to those who brought evil reports. In Rome the delatores held sway for a time and were paid for their services by the government. They apprehended assassins and accused persons of crimes. They brought accusations against various public officials, a great many times wrongfully. They became such an evil under Domitian that the next emperor, Nerva, ordered them to be driven out.

DELAUNAY, CHARLES EUGENE, a French mathematician; born at Lusigny, Aube, France, April 9, 1816; drowned Aug. 5, 1872, at Cherbourg, France. His work in mathematics and astronomy is treated in full in MOON, Vol. XVI, pp. 801, 802; and GEOLOGY, Vol. X, p. 225.

DELAUNAY, EMANUEL. See ANTRAIGUES, COMTE D' in these Supplements.

DELAUNAY, LOUIS ARSÈNE, a French actor, probably the greatest of the French actors of his day. He was born in Paris, March 21, 1826. He began his stage life in 1846, at the Odéon. He was chosen by many of the French playwrights for the first presentation of their work. He created the part of Hernani, in Hugo's play of that name, and the part of Télémaque, in *Ulysse*. Was made a chevalier of the Legion of Honor, and in 1877 professor of dramatic oratory at the Conservatory. He retired in 1887.

DELAVAN, a railroad town of Tazewell County, northern central Illinois, about 157 miles S.W. of Chicago, on the Chicago and Alton and the Peoria, Decatur and Evansville railroads. It has a variety of manufactories and a population (1890) of 1,171.

DELAVAN, a village in Walworth County, southwestern Wisconsin, on Turtle Creek, 58

miles S.W. of Milwaukee, on the Chicago, Milwaukee and St. Paul railroad. It is the seat of the State Institute for the Deaf and Dumb; has foundries and extensive dairies. Population 1895, 2,238.

DELAVAN, Edward Cornelius, an American temperance reformer; born in Schenectady County, New York, in 1793; died in Schenectady, Jan. 15, 1871. He acquired a large fortune in the wine business and owned considerable real estate in Albany, including the Delavan House, which was erected by him. He became interested in the temperance cause, and, with the assistance of Dr. Eliphalet Nott, he organized, in Schenectady, a state temperance society; he lectured, wrote and gave largely for the cause. In 1835 he charged an Albany brewing company with using filthy water for malting. Suit for libel and other suits were brought against him, but he won the first and the others were dropped. He published a temperance periodical, which became later the *Journal of the American Temperance Union.*

DELAWARE. For general account and history up to 1870, see Vol. VII, pp. 44, 45. The

STATE SEAL OF DELAWARE.

climate of Delaware is mild and healthful, except in the extreme south, where some fever is occasioned by the swamps. The temperature ranges from 30° to 38° in winter, and from 69° to 74° in summer. The average rainfall is about fifty inches. Agriculture is the chief industry in the middle and southern portions of the state, while manufacturing is the prevailing occupation of the inhabitants in the northern part. The census reports of 1890 give the following facts relative to the principal agricultural products of Delaware. Total number of acres in cereals, 289,650.

	Acres.	Bushels.
Indian corn	174,796	3,097,164
Wheat	94,368	1,501,050
Oats	19,374	382,900
Rye	775	6,625
Buckwheat	325	3.801

The total number of farms is given as 9,381, their acreage as 1,055,692, with a total valuation of $39,586,080. The farm implements and machinery were valued at $1,385,570, and the live-stock at $4,198,810. The estimated value of farm products was $6,481,590. In 1893 the number of farm-animals, with their value, was as follows: Horses, 25,553, value $2,049,814; mules, 4,826, value $491,549; milch cows, 31,330, value $757,246; oxen, 27,941, value $635,396; sheep, 13,551, value $48,987; swine, 521,167, value $365,167. The soil, climate and proximity to market all combine to make fruit-growing profitable, and peaches, apples and the small fruits all yield large crops and find a ready market in New York and Philadelphia. In 1893 the peach crop was a large one, over two million baskets being shipped to points outside the state. Immense quantities are canned, this industry being one of Delaware's most profitable lines of export. The strawberry crop also adds largely to the aggregate of the annual value of agricultural products.

The census returns show Delaware to have over 1,000 specified manufacturing industries, with an aggregate invested capital of $33,695,400, employing 21,906 hands, paying in wages, $9,892,387,

STATE CAPITOL, DOVER, DELAWARE.

and producing $37,571,848 worth of goods. The principal industries were the manufacture of cotton goods, car-building, the manufacture of chemicals and fertilizers, foundries and machine-shops, flouring-mills, iron and steel works, leather goods, etc. Over eighteen hundred hands were employed in ship-building, the shipyards at Wilmington being especially extensive. In sea-fisheries large capital is invested and many persons engaged. The oyster industry alone has some five hundred vessels and boats constantly employed throughout the season.

The number of miles of railroad in operation in 1891 was 333, with a capital of more than $7,000,000, and $112,347,873 representing the cost of equipment.

At the beginning of 1895 the total state assets were $1,031,842, the total liabilities $684,750. The school fund was $115,442, having been much depleted during the three years preceding by the expenditure of $42,187 for the purchase of free textbooks for the schools of the state. In 1895 there were six thousand colored children of school age in the state, who had never had the privileges of attending a public school. The total number of children within the school age (5 to 18 years) was, at the time of the enumeration in 1893, 40,400; enrolled in the schools, 19,340; average daily attendance, 12,200. The state college at Newark is conducted at an expense of about forty thousand dollars per year. The agricultural ex-

periment station, in connection with the college, receives as government aid about $35,000 annually. There is also a college at Wilmington, and a separate institution for colored students.

Among state institutions are the State Hospital for the Insane, at Farnhurst, with about 250 patients, the Industrial School for Girls, and the Industrial School for Boys. The deaf and dumb, the blind, and feeble-minded children are maintained in institutions outside the state, their support being provided for by annual appropriations.

There are about 300 churches in the state, the Methodist denominations leading in point of numbers. Of the 43 newspapers published in the state at the beginning of 1899, 6 are daily, 1 semi-weekly, 29 weekly, 3 semimonthly, and 4 monthly.

Wilmington, the principal city of Delaware, has a population of 61,431; Dover, the capital, 3,061; New Castle, 4,010. Important towns and villages are Smyrna, North Milford, Seaford, Lewes, Laurel, Delaware City, and Newark. The population of the state in 1880 was 146,608; in 1890, 168,493, of which 140,066 were white, 28,386 colored, 37 Chinese, and 4 Indians.

A new state constitution went into effect on June 10, 1897.

The following is the list of the governors of Delaware from 1789: Joshua Clayton, 1789–96; Gunning Bedford, 1796–97; Daniel Rogers, 1797–98; Richard Bassett, 1798–1801; James Sykes, 1801–02; David Hall, 1802–05; Nathaniel Mitchell, 1805–08; George Truett, 1808–11; Joseph Haslett, 1811–14; Daniel Rodney, 1814–17; John Clarke, 1817–20; Jacob Stout, 1820–21; John Collins, 1821–22; Caleb Rodney, 1822–23; Joseph Haslett, 1823–24; Samuel Paynter, 1824–27; Charles Polk, 1827–30; David Hazzard, 1830–33; Caleb P. Bennett, 1833–36; Charles Polk, 1836–37; Cornelius P. Comegys, 1837–40; William B. Cooper, 1840–44; Thomas Stockton, 1844–46; Joseph Maul, 1846; William Temple, 1846–47; William Thorp, 1847–51; William H. Ross, 1851–55; Peter F. Cansey, 1855–59; William Burton, 1859–63; William Cannon, 1863–67; Gove Saulsbury, 1867–71; James Ponder, 1871–75; John P. Cochran, 1875–79; John W. Hall, 1879–83; Charles C. Stockley, 1883–87; Benjamin T. Biggs, 1887–91; R. J. Reynolds, 1891–95; J. H. Marvil (died April 8), 1895; W. P. Watson, 1895–97; E. W. Tunnell, 1897.

DELAWARE BAY, an estuary of the Atlantic Ocean, 28 miles wide and 38 long, inclosed by Cape May, New Jersey, and Delaware. The Delaware River empties into it, and is here about four miles in width. The bay receives, also, the waters of the Maurice River and several smaller tributaries. Its entrance is between Cape Henlopen and Cape May, where it is about thirteen miles wide. A breakwater extending from the former point, built by the Federal government, makes the bay an excellent harbor, with from four to six fathoms of water.

DELAWARE OR DE LA WARR (THOMAS WEST), LORD, an American colonial governor. He became, in 1602, third Lord Delaware, and seven years later was appointed governor of Virginia, and the following year he arrived at Jamestown. The colonists were discouraged and on the point of sailing for England, but his coming and prudent measures inspired them with hopes of better times. The colony flourished under his management. He built and named the forts Charles and Henry, established the settlement where Hampton now is, and discovered the river called, in his honor, the Delaware. Illness obliged him to go back to England, but so much was he respected that the colonists petitioned him to return. While attempting to do so, he died, and was buried at sea, June 7, 1618.

DELAWARE CITY, a village in the northern part of Delaware, situated in Newcastle County, on the Delaware River, 40 miles below Philadelphia, on the Bay Ridge and Annapolis railroad. It is at the eastern terminus of the canal which connects the Chesapeake and Delaware bays. It has an academy and flouring-mills. Population 1890, 969.

DELAWARE INDIANS. For history, see INDIANS, Vol. XII, p. 831. The Delawares, with the exception of a scattered remnant in Ontario, Canada, are a part of the Cherokee Nation, in the Indian Territory, and number about 1,700.

DELAWARE RIVER, a river which rises in Delaware County, southern New York, flows westward till it reaches Pennsylvania, when it becomes the eastern boundary of that state. Its general course is southward, though it makes several turns toward the east and west. Near Shroudsburg, Pennsylvania, it breaks through the Kittatinny Mountains, at the Delaware Water Gap (q.v.), a place of remarkable beauty of scenery. Trenton and Philadelphia are the most important points on the river, Trenton being the head of navigation.

DELAWARE RIVER OR GRASSHOPPER CREEK, a river of northeastern Kansas, rises in Nemaha County, flows south-southeast and empties into the Kansas, 12 miles above Lawrence. Its length is about 75 miles. Its valley is very fertile and coal is found in the vicinity.

DELAWARE WATER GAP, a village of Monroe County, Pennsylvania, 92 miles N.W. of New York and 57 miles S.E. of Scranton. It is a summer resort, famous for the beauty of its scenery. The Delaware River, at this point, breaks through a gorge in the Kittatinny Mountains, and the steep, rocky banks rise nearly 1,300 feet above the water.

DE LA WARR, EARLS OF, a family of the British nobility, whose family name is West. The De la Warrs succeeded the Gresleys in the manorial rights of the town of Manchester, England. The title of Baron De la Warr was first given Sir Reginald West in the thirteenth century. The title was changed to Baron West in 1343, but reverted to De la Warr in 1579. The present (1896) Earl of De la Warr is Reginald Windsor Sackville. His eldest son and heir, bears the courtesy title of Viscount Cantelupe.

DELBRÜCK, MARTIN FRIEDRICH RUDOLPH, a German statesman; born in Berlin, April 16, 1817. He practiced law at the bar of Halle in 1839–40, and later entered the civil service, be-

coming assistant in the ministry of finances, then in that of commerce. In 1859 he became a director of the division of commerce and industry. He negotiated, in 1864, a commercial treaty between Prussia, France, Italy, Belgium and England, and in acknowledgment of his services was made president of the federal chancery in 1867. He afterward, in 1870, during the war with France, induced the princes of the North German states to unite in the empire. He prepared the constitution for the empire, and it was adopted without amendment. He became president of the imperial chancery in 1871, and remained in office until 1876, when he resigned as the result of a disagreement with Bismarck in regard to the financial policy of the government. He continued active in the Reichstag until 1880, when he retired. He was counted, during his active life, among the foremost men of his time.

DELEGATED GENERAL CONFERENCES. See METHODIST CHURCHES, in these Supplements.

DELEGATION, in law, means the transfer of a power or right by one or more persons to another. Any person capable of acting for himself may delegate the authority to another to act for him in most matters which concern his own rights. But when a bare power has been given to one, he cannot, as a rule, delegate it to another, for the reason that his principal has relied upon his ability and skill in granting the power. The question of the right of an agent to delegate his authority as an agent so as to bind his principal is a question frequently before the courts, and its determination depends chiefly upon the character of the agency.

DELESCLUZE, LOUIS CHARLES, a French communist, was born at Dreux, Oct. 2, 1809. His politics early drove him from France to journalism in Belgium, but the February revolution opened to him a career in Paris, where his clever and facile pen quickly made him popular with the rabble, but earned him, from the authorities, imprisonment and a fine of 10,000 francs. Again, at Paris, in 1853, he was sentenced to two years' imprisonment and was next transported to Cayenne, where he remained till 1859. His experiences of his sufferings he gave in *De Paris à Cayenne; Journal d'un Transporté* (1867). After his return he was quiet for some years, until his journal, *Le Réveil*, started in 1868 to advocate the doctrines of the International, brought him again into trouble. In the infamous history of the Paris Commune he played a prominent part, and upon his head rests, in great part, the guilt of its most execrable atrocities—the murder of the hostages. He was killed on the last barricade, May 28, 1871.

DE LESSEPS, FERDINAND. See LESSEPS, FERDINAND DE, in these Supplements.

DELFSHAVEN OR DELFTSHAVEN, a port of south Holland, on the Maas, a mile W. of Rotterdam. It was from here that the Pilgrim Fathers departed for America. It is principally employed in ship-building, iron-working and distilling. Population, 13,138.

DELFTWARE. See POTTERY and PORCELAIN, Vol. XIX, p. 631.

DELGADA OR PONTA DELGADA, the largest town of the Azores Islands, on the island of São Miguel. Lat. 37° 40′ N., long. 25° 36′ W. The anchorage here in the roadstead has been greatly improved by the building of the breakwater, and the town has a considerable trade, exporting wheat, maize and oranges. Population, 17,940.

DELHI, a village and the capital of Delaware County, southern New York, on the west branch of the Delaware River, on the New York, Ontario and Western railroad. It contains manufactories of sash and blinds, carriages and woolen goods. Population 1890, 1,564.

DELIBES, CLÉMENT PHILIBERT LÉO, French composer; born Feb. 21, 1836, at St. Germain-du-Val, Sarthe; entered the Paris Conservatoire in 1848, and in 1855 produced an operetta, *Deux Sacs de Charbon*. At the Grand Opéra, where he became second director in 1865, his music for the ballet *La Source* (1866) met with great success, and his ballet music for *Coppélia* (1870), his finest work, secured his position as a composer. He wrote music for a third ballet, *Sylvia* (1876), and for three light operas, *Le Roi l'a Dit* (1873), *Jean de Nivelle* (1880), and *Lakmé* (1883), his chief success. In 1880 he was appointed professor of composition in the Conservatoire, and became a member of the Académie des Beaux-Arts and an officer of the Legion of Honor. Died in Paris, Jan. 17, 1891.

DELIRIUM NERVOSUM OR TRAUMATICUM, a term applied by Baron Dupuytren, the famous French surgeon, to an attack of delirium with tremors, which often supervenes on severe bodily injuries, as burns, fractures and gunshot-wounds. Some have considered it identical with delirium tremens; but it only simulates that affection, being but a symptom of a sympathetic typhoid fever.

DELIRIUM TREMENS. See DELIRIUM, Vol. VII, p. 50.

DELISLE, GUILLAUME, a French geographer; born in Paris, Feb. 28, 1675; died there, Jan. 25, 1726. He was directed to the study of geography by his father, Claude Delisle, himself a noted geographer. In 1700 he completed the work for which he is famous, the change of the then existing system of geography. This work directed public attention to him, and in recognition of his services he was made "Geographer to the King" by Louis XV. See also GEOGRAPHY, Vol. X, p. 188.—His brother, JOSEPH NICHOLAS DELISLE, a noted astronomer. See LISLE, Vol. XIV, p. 694.

DELITZSCH, ADOLF FRANZ, a German theologian and Hebraist; born at Leipsic, Feb. 23, 1813; died there, in March, 1890. He studied at the University of Leipsic, and in 1846 became professor of theology at Rostock, whence he was called to Erlangen in 1850 and back to Leipsic in 1867. He held a foremost place among conservative German theologians. He published a number of commentaries highly valued to-day. Among his writings are *History of the Poetry of the*

Jews (1836); *Scholastical Documents of the Jews and Mohammedans of the Middle Ages* (1841); *A System of Biblical Psychology* (1855); and *A Day in Capernaum.*—His son, FRIEDRICH DELITZSCH, an Assyrian scholar, was born in Erlangen, Sept. 3, 1850. He occupies the chair of Assyrian at the University of Leipsic. Among his published works are *Assyrian Studies* (1874); *The Chaldean Genesis* (1876); *Where Was Paradise?* (1881); and *Assyrian Dictionary* (1890).

DELIUS, NICOLAUS, a German philologist and Shakespearean scholar; born in Bremen, Oct. 19, 1813; died at Bonn, Nov. 18, 1888. He was educated at Berlin and Bonn; in 1855 became professor of the English language in the University of Bonn. He gave particular attention to Romance literature, and especially to Shakespeare, being noted as a critic of that author. Among his writings on Shakespeare are *The Shakespeare Myth* (1851); *A Shakespeare Lexicon* (1854); and an edition of Shakespeare's works (1861).

DELLA CRUSCAN ACADEMY, an institution founded in 1582, in Florence, Italy, with a view to purifying and perfecting the Tuscan tongue. See ACADEMY, Vol. I, pp. 73, 74.

DELLA CRUSCAN SCHOOL. About the year 1785 there was published *The Florence Miscellany*, a collection of verses written by a number of English residents at Florence as an amusement during their idle hours. The insipidity, affectation and fantastic silliness of the productions transcend all belief, but at that period poetry was at so low an ebb that a crowd soon admired and began to imitate them. The Della Cruscans, taking their name from the academy at Florence, now began to print their works in England, mainly in two daily newspapers, called *The World* and *The Oracle.* These effusions were published in great numbers until 1794, when the keen satire of William Gifford, in his *Baviad*, made the writers appear so ridiculous that their enthusiasm was soon spent. Prominent among these writers were Mrs. Hannah Cowley ("Anna Matilda"), Robert Merry ("Della Crusca"), and Edward Jerningham ("The Bard").

DELMAR, ALEXANDER, an American political economist; born in New York City, Aug. 9, 1836. He was editor of several New York papers, among them *Hunt's Merchants' Magazine*, and in 1864 established the *Social Science Review.* He organized the United States Bureau of Statistics, attained distinction as a mining expert, and was the author of *Gold Money and Paper Money* (1862); *Treatise on Taxation* (1865); *Essays on Political Economy* (1865); *The National Banking System* (1865); *What is Free Trade? Letter on the Finances;* and *History of Money* (1885). The article on SILVER in this ENCYCLOPÆDIA was written by Mr. Delmar.

DEL NORTE, the capital of Rio Grande County, southern Colorado, on the Rio Grande River, and on the Denver and Rio Grande railroad. It is one of the chief towns of southwestern Colorado, and is situated at an elevation of 7,807 feet, amid fine picturesque scenery. This place is the base of supplies for the San Juan mines. Population 1890, 736.

DE LONG, GEORGE WASHINGTON, an American explorer; born in New York City, Aug. 22, 1844; died in Siberia, Russia, Oct. 30, 1881. He was educated in the public schools at Brooklyn. In 1861 he was appointed midshipman at the United States Naval Academy, was graduated in 1865, became master, March 12, 1868, and lieutenant-commander, Nov. 1, 1879. In 1879 James Gordon Bennett, Jr., purchased the *Jeannette*, a steam-vessel that had been built for polar exploration, and had her strengthened and fitted for a three years' Arctic voyage by way of Bering Strait, under the authority of the government. On July 8th this vessel sailed from San Francisco, with Lieutenant De Long as commander, assisted by four more officers of the navy and twenty-eight others. For a description of the voyage, see POLAR REGIONS, Vol. XIX, p. 326. His widow, Mrs. Emma De Long, published his story in *The Voyage of the Jeannette* (2 vols., 1884).

DELORME, MARION, a Frenchwoman who became notorious in the seventeenth century. She made her house the rallying-point of the chiefs of the "Frondeurs" during the first disturbances of that party, and for this Mazarin was about to imprison her, when she suddenly died. Previous to the time of the Frondeurs she had held sway over the Duke of Buckingham, Cardinal Richelieu, the Duc de Brissac, and others almost as prominent. She was a woman of great beauty and brilliant wit. Victor Hugo made her the subject of one of his historical novels, and her character was represented in the drama *Cinq Mars* (1826), by Alfred de Vigny.

DELORME, PHILIBERT, a French architect; born in Lyons, about 1518; died in 1577. He attracted attention while still in Lyons, and was soon called to Paris, where he designed the Tuileries, the chateaux at Meudon and Anet, and aided in building the chateau at Fontainebleau. He studied in Rome, and, upon his return to France, strove to replace the Gothic styles with those of the Romans. He published one work, *New Inventions for Building Well at Little Expense.*

DELPHI, a city and the capital of Carroll County, northwestern central Indiana, 19 miles S.W. of Logansport, on the Wabash River, the Wabash and Erie canal, and Louisville, New Albany and Chicago and Wabash railroads. The water-power is excellent, and is utilized in running paper and planing mills. Population 1890, 1,923.

DELPHIN CLASSICS. See BIBLIOGRAPHY, Vol. III, p. 657.

DELPHINIDÆ. See MAMMALIA, Vol. XV, p. 398.

DELPHINIUM. See HORTICULTURE, Vol. XII, p. 255.

DELPHINUS, a constellation in the northern hemisphere, near Aquila. It is commonly called "Job's Coffin," on account of its shape; however, the derivation of the name, meaning *a dolphin*, would indicate that the ancients likened it to that fish. Its brightest star is one between the

third and fourth magnitudes, and four others are of the fourth magnitude.

DELPHOS, a city of Allen County, northwestern Ohio, situated on the Miami canal, and on the Northern Ohio, Pittsburg, Fort Wayne and Chicago, and Toledo, St. Louis and Kansas City railroads. It contains a Franciscan convent, and manufactories of barrels, staves and wheels. Population 1890, 4,516.

DELPIT, ALBERT, a French author; born in New Orleans, Louisiana, Jan. 30, 1849; died in Paris, Jan. 4, 1893. He was educated in France, went to Louisiana, but soon returned to France, where he remained. He engaged in journalism. His first publication was a *Eulogy of Lamartine*, written to obtain a prize. He served through the Franco-Prussian war with distinction, and received in recognition of his services the cross of the Legion of Honor. He was the author of a number of poems, dramas and novels. His poems are collected into a volume entitled *Les Dieux qu'on Brise*. Among his dramas are *Le Fils de Coralie* (1880); *Le Père de Martial;* and *Passionnément* (1891). His novels, by which he is best known, include *La Vengeresse* (1874); *Mademoiselle de Bressier* (1886), and *Disparu* (1888).

DEL RIO, a town and the capital of Valverde County, southwestern Texas, on a tributary of the Rio Grande, and on the Southern Pacific railroad. It is the center of a system of irrigation, and has an ice-factory and cotton-gins, and is supplied with electricity and water-works. In the neighborhood are large unworked deposits of mineral paint. Population 1890, 1,980.

DELSARTE, FRANÇOIS ALEXANDRE NICOLAS CHÉRI, a French teacher of elocution; born in Solesmes, Dec. 19, 1811; died at Paris, July 19, 1871. He studied for the operatic stage, but his voice failed him, and he was obliged to devote himself to giving instruction in elocution. He gave much time to the study of dramatic art, which he carried to the point of asserting the existence of art in all human emotions and motions. His system is known as the DELSARTE SYSTEM (q.v., in these Supplements). He became the center of a school, and was the recipient of many honors.

DELSARTE SYSTEM, the name given to a method of general physical training by which the æsthetic and emotional nature of man in its relations to the art of expression is elaborately portrayed. From a somewhat vague statement of its author, François Delsarte, it is possible to detach certain fundamental principles deduced from the scientific postulate that "every outward manifestation is the expression of an inner state," —a truism to the average understanding. The dominating ideas of the system may be summarized in a series of psychophysical exercises, comprising movements tending to restore debilitated nervous energy, movements calculated to augment nerve-force, movements calculated to harmonize the physical and intellectual powers, the general result being improved health, even and normal development and natural expression. The practical benefit derived from the Delsartean system has been frequently demonstrated, and to dramatists, orators and elocutionists has proved of undoubted efficacy in inculcating methods of vocal utterances and qualities of tone, gestures and expression in keeping with the highest elocutionary art. In the United States the system has gained wide acceptance, especially in the larger cities, where regular courses of instruction, both public and private, have been established.

DELTA. See GEOLOGY, Vol. X, p. 278.

DELUNDUNG, the native name of the spotted weasel-cat (*Prionodon gracilis*), found in the Malayan regions. It belongs to the civet family (*Viverridæ*). The name *linsang* is often applied to the animal. The color is white, with black bands and spots.

DELVINO, a town in the province of Albania, southeastern European Turkey, 47 miles W.N.W. of Janina. It is in a district of large orange and olive plantations. Population, about 10,000.

DEMAND AND SUPPLY. See VALUE, Vol. XXIV, pp. 47, 48.

DEMAVEND, MOUNT, an extinct volcano in Persia, forming the highest peak of the Elburz chain, which separates the low shores of the Caspian Sea from the high table-land of Persia, about lat. 35° 55′ N., long. 52° 10′ W. The summit is covered with a deposit of sulphur, which is brought to the plains in bags, to be disposed of as an article of commerce. No European ascended this peak until 1837. The Russian survey ascertained the height to be 18,600 feet. See CASPIAN SEA, Vol. V, pp. 176, 177.

DEMBEA, TSANA, TZANA OR TANA LAKE, a body of water 40 miles long and 28 wide, in western Abyssinia, at lat. 12° N., long. 37° 15′ E. It is in a fertile plain, 6,108 feet above sea-level, and contains many beautiful islands. The Blue Nile issues from its southern end. See NILE, Vol. XVII, p. 507.

DEMERARA. See GUIANA, Vol. XI, pp. 249, 250.

DEMESNE, in the law of England at the present day, the right which the owner in possession of lands in fee-simple has in his estate. But the original signification of "demesne" was that portion of the lands of a manor which the lord of the manor reserved for his immediate use and occupation. In ancient English law it was a tenure by which all manors belonging to the crown, in the reign of William the Conqueror, were held. The number, names, etc., of these were all entered in a book called DOMESDAY BOOK; q.v., Vol. VII, pp. 349–351.

DEMETRIUS THE FALSE. See RUSSIA, Vol. XXI, pp. 94, 95.

DEMETZ, FREDERIC AUGUSTE, a French philanthropist, one of the founders of the colony at Mettray, in France, for the reformation of juvenile offenders; born in 1796; died Nov. 2, 1873. He became a judge in Paris, and while in that position became interested in criminology. He visited the prisons of the United States in com-

pany with De Tocqueville. He established a system of criminal reform, which he enforced at Mettray, and which is also in use elsewhere.

DEMI-BASTION, in fortification, a kind of half-bastion, which frequently terminates the branches of a crownwork or hornwork, and which is also occasionally used in other places. See FORTIFICATION, Vol. IX, p. 434.

DE MILLE, JAMES, a Canadian writer and educator; born in August, 1837, in St. Johns, New Brunswick; died in Halifax, Nova Scotia, Jan. 28, 1880. He was a natural writer, and while at Brown University, and before his graduation in 1854, wrote several college songs which became popular. From 1860 to 1865 he was professor of the classics at Acadia College, and from 1865 to 1880 professor of rhetoric and history at Dalhousie College, Halifax. Among his published writings, mostly stories of adventure, are *Andy O'Hara* (1860); *The Arkansas Ranger* (1865); *A Comedy of Terrors* (1871); and among his stories for boys, *Lost in the Fog;* and the *Boys of Grand Pré School.* He is best known by his tales of mystery and puzzling complication, suggestive of the art of Wilkie Collins. The chief of these are *The Cryptogram* (1871); *The Dodge Club* (1866); *Cord and Crease* (1869); and *The Lady of the Ice* (1870). While, at times, lacking cohesion and narrative precision, they have the quality of holding the attention.

DEMILUNE OR RAVELIN. See FORTIFICATION, Vol. IX, p. 445.

DEMING, a city of Grant County, southwestern New Mexico, situated on the south bank of the Rio de los Mimbres, about fifty miles below Silver City, on the Southern Pacific and Atchison, Topeka and Santa Fé railroads. It was founded in 1881, in the center of an extensive stock-range. Lead and silver are found in the vicinity in abundance. A United States custom-house is located here, and there is a thriving trade with the mining camps of the district and with Mexico. Population 1890, 1,136.

DEMIURGE. See GNOSTICISM, Vol. X, p. 703; MARCION, Vol. XV, pp. 533–535.

DEMOCEDES, a Greek physician who, when captured by the Persians under Darius, gained great favor with Darius by his skill in curing the king and his queen, Atossa. He was kept a prisoner for a number of years, but succeeded in escaping by the aid of Atossa, who persuaded the king to send Democedes with a spying party to Greece; the party was captured and Democedes set free. His captivity was about 522 B.C.

*DEMOCRATIC PARTY. When the constitution of the United States became the supreme law of the land, the duty of putting in motion the machinery of the new government devolved on its friends, the Federalists. This they did, and in the course of time funded the debt contracted by the Continental Congress, assumed and funded the Revolutionary debts of the states, established a national bank, and began a system of internal taxation. Each of these measures was stoutly opposed as unnecessary, inexpedient or unconstitutional, because power to do them was not expressly given by the constitution. Taken together, they were declared to have a nationalizing tendency, very dangerous to democratic government, and showing a strong leaning toward monarchy. So bitter was the feeling aroused, that Jefferson, with the aid of Madison, began the formation of a party, which they called the *Republican*, and established the *National Gazette* (1792) at Philadelphia, to set forth the principles of the new party.

So far, the Republican party was based on opposition to the domestic policy of the administration. But in 1793 Washington issued his proclamation of neutrality between France and her enemies, and added a new element to popular discontent. Thenceforth the Republican, or as it began to be called, the Democratic-Republican, party was the warm friend of France, and its policy of a decidedly French cast. In 1794 it attempted to provoke war with England, and forced Washington, in the interest of peace, to send John Jay to England to negotiate a treaty. When the treaty was made it was denounced, its negotiator was burned in effigy, and the President attacked with a violence beyond description. In these sentiments a large part of the Republicans did not share, and so long as Washington was willing to serve as President, the people were willing to have him. But in 1796, when he declined a third term, the Republicans formally brought forward Jefferson as a candidate, and succeeded in electing him Vice-President.

The insults from France, and the excitement over the X Y Z Mission and the quasi war (1798–1800), checked their success for the time being. But the Federalists passed (1798) the Alien or Sedition acts. The Republicans replied with the Virginia and Kentucky resolutions, and in 1800 swept the country, elected Jefferson and Burr, and for 24 years retained control of the Federal government. During this period they repealed all internal taxes, bought Louisiana from France (1803), reduced the national debt from $83,000,000 in 1801 to $45,000,000 in 1812, laid the famous embargo of 1807–09, and fought the War of 1812. By these acts the party showed that it was rapidly departing from its old doctrine of strict construction of the constitution, and that it was under the control of a new generation, led by Clay, Adams, Calhoun, Crawford, Grundy and Lowndes.

The disastrous experience of the War of 1812 modified the old policy yet more, and in 1816 the Republicans established the second national bank and laid a protective tariff, which was made more protective still in 1824, and showed a strong desire to spend public money on roads and canals. But against these changes the South revolted. The cotton-growing, tobacco-raising, rice-producing states cared nothing for manufactures,—nothing for internal improvements; and in 1824 the Republican party split into four factions, led by John Q. Adams, Henry Clay, Andrew Jackson and W. H. Crawford. The result was, no election by the electoral colleges; a coalition of the

*Copyright, 1897, by The Werner Company.

Adams and Clay men (both friends to internal improvements and the tariff) and the election of Adams by the House of Representatives; and the rise of two new and unnamed parties,—the "Adams men" and "Jackson men."

With the election of Jackson in 1828 the second wing of the Republican party came into power, and soon took the name of Democratic. It was the old Republican party purged of its progressive element. It stood, therefore, for strict construction of the constitution, and was antibank, antitariff, and against internal improvements at Federal expense. During Jackson's first term, the party as a whole was not ready to accept all these principles, and he was therefore forced to make an unprecedented use of the veto power, in order to defeat internal improvement bills passed by the National Republicans with the aid of Democratic votes. By the close of his administration these had been driven from the party, which then took and held the strict construction views of the constitution.

The memorable events of Jackson's "reign" are his war on the national bank; his defeat of the nullifiers; the passage of the compromise tariff of 1833; the payment of the national debt; the gold act of 1834; the specie circular; the removal of the deposits; the vote of censure by a Whig Senate, and the expunging of it by a Democratic Senate; the distribution of the surplus revenue; and the introduction, in 1832 and 1835, of the national nominating convention as a political institution. At the former (held at Baltimore, in May, 1832), Jackson and Van Buren were nominated; and at the latter (held at Baltimore, in May, 1835), Van Buren and R. M. Johnson.

The wild era of speculation on which the people entered in 1830, aided by the removal of the government deposits from the Bank of the United States, the specie circular and the distribution of the surplus, brought on the panic of 1837, and added to the principles already held by the Democrats the new one of "divorce of bank and state." The pledge was made good by the establishment of the subtreasury system on July 4, 1840.

The political principles which had thus been accepted in the course of 12 years were taken up in 1840 by the national convention of the party, and set forth in its first party platform. A few planks may be mentioned:

1. That the Federal government is one of limited powers.
2. Congress has no power to carry on a general system of internal improvements.
3. Congress has no power to charter a bank.
4. The divorce of bank and state.
5. No protective tariff.

On this platform Van Buren was nominated in 1840, and beaten by the Whigs in the famous "Log-Cabin-Hard-Cider" campaign. For a moment the Democrats seemed to be driven from power; but the death of Harrison (April 4, 1841) put Tyler in the chair, and for four years they continued to defeat Whig measures. In 1844 it again went into power, and elected James K. Polk and G. M. Dallas. Then came the annexation of Texas; the settlement of the Oregon boundary line; the re-establishment of the subtreasury system destroyed by the Whigs; the war with Mexico; the acquisition of new territory; the split in the party on the question of extending slavery into the new territories; and the defeat, in 1848, of Lewis Cass and W. O. Butler. The compromise of 1850 closed the breach, and in 1852 Franklin Pierce and W. R. King were elected; but the Kansas-Nebraska Act of 1854 re-opened it, and, though the party elected James Buchanan and John C. Breckenridge in 1856 (the nominating convention met at Cincinnati, June 2d), the division grew wider, and in 1860 two sets of candidates, John C. Breckenridge and Joseph Lane, and Stephen A. Douglas and H. V. Johnson, with two platforms, were put before the people. The one, the Breckenridge or Southern platform, set forth,—1. That slavery in a territory could not be forbidden by Congress, nor by the territorial legislature, nor by the people in an unorganized territory; 2. That the Federal government was bound to protect slave-owners in their property in slaves in the territories; 3. That the right of the people to decide the question of slavery could not be exercised till they were making their first state constitution. The Douglas platform announced the principle of "popular sovereignty," or the right of the people in a territory to settle for themselves whether that territory should be slave or free.

With its defeat in 1860, the Democratic party lost control of national affairs for a period of 24 years. The party candidates during this period were G. B. McClellan and G. H. Pendleton in 1864; Horatio Seymour and F. P. Blair in 1868; Horace Greeley and B. Gratz Brown in 1872. The war had settled forever the old issues of slavery, and in the 11 years which had since elapsed new economic questions had arisen. On these the Democratic party took its stand, and in 1876 declared for universal amnesty and against negro suffrage, against a protective tariff, and for the payment of the national debt in legal-tender paper (greenbacks), except when expressly made payable in coin. In 1876 it nominated Samuel J. Tilden and T. A. Hendricks, obtained a majority of the popular vote, a majority of the members of Congress (42 out of 76 in the Senate; 149 out of 293 in the House), and claimed to have elected Tilden. This the Electoral Commission decided against the Democrats.

In 1880 the party convention (held at Cincinnati June 22d) placed Winfield Scott Hancock and W. H. English in nomination on a platform whose brevity and tameness mark a transition from old issues to new. At the election, 4,447,888 Democratic votes were cast, and 19 states, with 155 electoral votes, were carried. The Republicans secured 214 electoral votes. The long and specific platform of 1884 set forth the new issues very clearly. They were: Economy; lower taxes; tariff reform; honest money, "and a currency convertible into such money without loss"; civil

service reform; no more land grants to corporations; an "American policy"; and the "revival of American shipping." The candidates were Grover Cleveland and Thomas A. Hendricks, who were elected by a plurality of 62,683 votes.

Four years later, June 5, 1888, Cleveland was again nominated. Hendricks was then dead, and Allen G. Thurman was nominated for the second place by the convention sitting at St. Louis. The platform was a *résumé* of what the party had done since 1884, and made few pledges for the future. This time the Republicans won, though the Democratic plurality was 100,476

When the national convention met again (at Chicago, June 21, 1892), the great issues before the country were the tariff, the silver legislation of 1890, reciprocity and trusts. The platform of that year, therefore, calls for a tariff for revenue only; a repeal of the McKinley Act and of the Sherman Act; more legislation against trusts; repeal of the ten-per-cent tax on state bank issues; the improvement of waterways; and the protection of railway employees. Again the candidate was Grover Cleveland, with whom was now associated Adlai E. Stevenson, and again the Democrats won, with a plurality of 382,956. Of 444 electoral votes, Cleveland received 277, Harrison 145, Weaver 22.

The party was now in control of the Presidency, the Senate and the House, but the panic of 1893, the Hawaiian policy of the President, the income tax, the Wilson tariff, the action of the party in the Senate on the repeal of the silver-purchasing clause of the Sherman Act, turned the popular feeling against the Democrats, and at the fall elections of 1894 the Republicans regained the House by an immense majority

At the next national convention, which met in Chicago, July 7, 1896, the paramount issue, as presented by a majority of the delegates, was the demand for free and unlimited coinage of silver at the ratio of 16 to 1. The other planks of the platform—tariff for revenue only; income tax; early admission of all territories as states; opposition to bond issues, to government by injunction and to life tenure in the civil service; the demand for Federal control of pools and trusts, etc.,—all these were overshadowed by the dominant cry of "free silver." The debate on this subject culminated in the eloquent speech of William J. Bryan of Nebraska, who was accordingly nominated as the Democratic candidate for President, with Arthur Sewall of Maine for Vice-President. A considerable minority of the delegates, especially those from the Eastern states, stood for the gold standard, and refused to indorse the "free silver" plank of the platform. On August 8th, representatives from thirty-three states met at Indianapolis and issued a call for a "sound money" convention, in the name of the national Democratic party, to be held at Indianapolis, Sept. 2, 1896. The Populist convention at St. Louis (July 27th) also nominated Bryan for President, but refused to accept Sewall, and nominated Thomas E. Watson of Georgia for Vice-President. In November the Democrats were defeated.

J. B. McMaster.

DEMODEX. See Arachnida, Vol. II, p. 276.

DEMOGEOT, Jacques Claude, a French author; born in Paris, July 5, 1808. He was professor in the colleges of Beauvais, Rennes, Bordeaux and Lyons, and in 1834 became professor of rhetoric at the Lycée Saint Louis, in Paris. He was made an officer of the Legion of Honor. He is the author of textbooks on French literature, and of many other works, including *Letters and Men of Letters of the XIXth Century* (1856); *History of French Literature from Its Beginning to Our Own Time* (1852); *French Literature of the XVIIth Century Before Corneille and Descartes* (1859); *A Text-Book of Classical French Literature* (1868); and *History of Foreign Literature* (1880).

DEMOISELLE, a name often applied to the Numidian crane (*Anthropoides virgo*). It ranges from Mongolia to Africa. See Crane, Vol. VI, p. 546.

DEMOPOLIS, a city of Marengo County, central eastern Alabama, on the Tombigbee River, and on the Southern railroad It has lumber-mills and oil-mills, besides a large trade in cotton. Population 1890, 1,898.

DEMOS. See Nobility, Vol. XVII, pp. 526, 527.

DEMOSTHENES, an Athenian general. See Syracuse, Vol. XXII, p. 815.

DEMOTIC WRITING. See Hieroglyphics, Vol. XI, p. 794.

DENARIUS. See Numismatics, Vol. XVII, pp. 652, 655.

DENDRERPETON, a small labyrinthodont amphibian, found as a fossil in the coal-measures of Nova Scotia. It is closely related to *Archegosaurus*. The name, signifying "tree-lizard," refers to its having been found in a tree (*Sigillaria*), but it is probable that this was not its natural abode.

DENDRITE, the name given to a peculiar branching mineral crystallization on the surfaces of the fissures and joints, or in the surfaces of rocks, having the appearance of moss, and often mistaken for fossil plants. The hydrous oxide of manganese is the mineral that generally assumes this form, occurring frequently in great abundance in limestone, steatite, trachyte and other substances.

DENDROBIUM, a genus of tropical epiphytic orchids, cultivated in conservatories for their beautiful and often grotesque and fragrant flowers.

DENDROLITES, petrified stems of trees or shrubs found in all parts of the world in the formations called secondary, especially in the coal formation. They vary in size, and may be considered the remains of a former creation. In some instances gigantic stems occur, which often contain branches, fruit and even the impressions of leaves; and in other places mere fragments are found, which bear no resemblance to the trees now growing in the same regions, the fossil stems of beautiful palms having been discovered at Chemnitz, in Saxony, and other similar places. Such woods, when preserved in ancient strata altered by volcanic fire, are changed into agate, or into pitchstone. Opinion is divided regarding their origin.

DENDROPHIDÆ. See Snakes, Vol. XXII, pp. 192, 195.

DENGUE or BREAKBONE FEVER, also called Dandy and Bucket Fever, a disease known in the Southern states of North America, and in the West Indies and Africa, where it was first

described as having appeared in 1827 and 1828. It is seldom fatal, though very violent in its access, mainly consisting of an attack of inflammatory fever, accompanied by pains of the limbs and muscles. The acute stage lasts seven or eight days. This fever is said to be infectious.

DENIS, JEAN FERDINAND, a French traveler and writer; born in Paris, Aug. 13, 1798; died there, Aug. 2, 1890. He spent a number of years traveling in South America, and, later, in Portugal and Spain. He was made an officer of the Legion of Honor, and at the time of his death was administrator of the St. Genevieve Library. He published a number of works descriptive of his travels; among them, *Buenos Ayres and Paraguay* (1825); *History of the Literature of Portugal and Brazil* (1833); and *Chronicles of the Chivalry of Spain and Portugal* (1837). He wrote a number of articles for encyclopædias of the time, and also a series of valuable translations.

DENISON, a town and the capital of Crawford County, central western Iowa, 64 miles N.N.E. of Council Bluffs, situated on the Boyer River, and on the Chicago and North-Western railroad. It has thriving manufactories and a normal college. Population 1895, 2,256.

DENISON, a city of Grayson County, central northeastern Texas, situated within three miles of the northern boundary of the state, on the Missouri, Kansas and Texas, and the Houston and Texas Central railroads. It is a railroad shipping and trading center, and is especially noted as a fruit market. It has excellent water-works and considerable manufactures. It contains St. Xavier convent, a business college, good schools, ice factory, meat refrigerator, planing-mill, iron-foundry, and railroad machine-shops. Population 1880, 3,975; 1890, 10,958; 1897, (estimated) 20,000.

DENISON, EDWARD, a British philanthropist; born in 1840; died in Australia, Jan. 26, 1870. He was the son of Edward Denison, bishop of Salisbury, and by reason of his position in society was of great influence in the work to which he devoted his short life—the relief of the poor of London. He lived for eight months in East London, associating with the poor and criminal classes. He organized a school and began the system of education of the poor which has developed into the "university settlements" and "commons." His influence brought about the organization of the present Associated Charities Societies. His health failed him and he died while on a voyage to regain it. See also CHARITY ORGANIZATION, in these Supplements.

DENISON, GEORGE ANTHONY, an English ecclesiastic; born in 1805, in Ossington, Nottinghamshire, England; became vicar of East Brent in 1843, and archdeacon of Taunton in 1851. On a charge of teaching the doctrine of the real presence he was condemned by an ecclesiastical court in 1854 to be deprived of his preferments; but the judgment was quashed by the Courts of Arches and the Privy Council. He became a leader of the High Church party, an opponent of secular education, and an advocate of the confessional. He was for many years editor of the *Church and State Review*, and was chairman of the committee of convocation which condemned Bishop Colenso's works. His principal literary productions are his delightful *Notes of My Life* (1878) and *Mr. Gladstone* (1885).

DENISON UNIVERSITY, an institution for the instruction of men, located at Granville, Ohio. It was organized under the auspices of the Baptist Church in 1831 as a manual-labor school, under the name of Granville Literary and Theological Institute, which in 1845 was changed to Granville College and in 1856 to its present name. Affiliated with it are Granville Academy, a preparatory school, and Shepardson College, a school for women. Denison University had, in 1895, a faculty of 21, with 197 students, and a library of 6,000 volumes. Since the organization 450 had been graduated. It has an endowment of $400,000, and an annual income of $30,000.

DENIZLI, a town in the government of Aidin, southwestern Asia Minor, on a railroad, 60 miles E. of the city of Aidin. The chief industry is making leather and leather manufactures. In 1715 over 10,000 people were killed here by an earthquake. Population, 20,000.

DENMAN, GEORGE, an English jurist, the fourth son of Thomas, first Baron Denman (q.v., Vol. VII, p. 79), was born in London, Dec. 23, 1819. He was educated at Repton Grammar school, whence he went to Trinity College, Cambridge, of which he became a scholar and a fellow, taking his B.A. degree in 1842. He was called to the bar in 1846, at Lincoln's Inn. In 1857 he was appointed one of the Cambridge University counsel. He unsuccessfully contested the University in 1856; but was subsequently elected for Tiverton, which he represented, with one interval, until 1872. He promoted and carried bills for assimilating the laws relating to evidence, and for abolishing the disqualifications of witnesses for want of religious belief, and on other grounds. In 1872 he succeeded to a vacancy in the Court of Common Pleas, and on the passing of the Judicature Act in 1875, became a judge in the High Court of Justice. In 1893, after twenty years' service, he retired from the bench; in 1893 was sworn a Privy Councilor, and became a member of the judicial council of the Privy Council. He published a translation, into Greek elegiacs, of *Gray's Elegy* (1871); and a Latin elegiac revision of the first book of *Pope's Homer*. He died in London, Sept. 21, 1896.

DENMARK. For the early history, climate, productions, commerce, etc., of the kingdom of Denmark, see Vol. VII, pp. 80–94. According to the last decennial census, taken Feb. 1, 1890, the total area of Denmark was 15,289 square miles, and the total population 2,172,305. The population in 1870 was 1,794,733, and in 1880 1,980,259, showing an increase, during each of the two decennial periods, of nearly ten per cent, or one per cent per annum. In Denmark proper the town population has increased from 515,758 in 1880 to 663,121 in 1890, or at the rate of 28.7 per cent; while the rural population has increased

from 1,453,281 in 1880 to 1,509,084 in 1890, or at the rate of 3.77 per cent. The population is almost entirely Scandinavian. Out of every 1,000 persons 469 live exclusively by agriculture, 229 by manufacturing industries, 68 by trade and 27 by seafaring and fishing.

The revenue for 1894 was $18,182,557 and the expenditure $16,576,740. The financial budget of 1896-97 provided for a total revenue of $18,204,467 and a total expenditure of $18,203,144. An important feature in the administration of the finances of the kingdom is the maintenance of a reserve fund of a comparatively large amount. On March 31, 1895, the fund stood at $4,905,767. The object of the reserve fund is to place means at the disposal of the government in the event of sudden emergencies. The public debt of Denmark, which was incurred in part by large annual deficits in former years, before the establishment of parliamentary government, and in part by railway undertakings and the construction of harbors, lighthouses and other works of public importance, amounted at the close of the fiscal year, March 31, 1895, to $56,275,556. The investments of the state, including the state railways, amount to about $67,071,194.

The army consists of all the able-bodied young men of the kingdom who have reached the age of 22 years. They are liable to service for eight years in the regular army and its reserve, and for eight years subsequent in the extra reserve. The total peace strength of the army in 1894 was 778 officers and 13,152 men; the total war strength, about 75,000 men.

About eighty per cent of the total area of Denmark is productive. According to latest returns, the total area under corn crops was 3,029,404 acres; potatoes, 128,849 acres; clover, 456,585 acres; bare fallow, 638,116 acres; grass, meads, etc., 2,625,865 acres. The leading crops in 1894 were: Oats, 28,900,000 bushels; barley, 21,760,000 bushels; rye, 15,670,000 bushels; wheat, 4,035,000 bushels; potatoes, 15,900,000 bushels; other roots, 85,453,952 bushels; besides vegetables, hay and clover. The total value of the produce in 1894 reached $70,971,925. The total imports for the year 1894 amounted to $104,227,665, and the exports to $71,189,424. On July 16, 1893, there were in Denmark proper 410,639 horses, 1,696,190 head of cattle, 1,246,552 sheep, 25,266 goats, and 829,131 swine.

In 1894 there were in Denmark a total length of 1,332 English miles of railway open for traffic, of which 1,067 miles belonged to the state.

The Lutheran remains the established religion. There is complete religious toleration. In 1890 four fifths of the population belonged to the Lutheran Church. Of the remainder, 4,080 were Jews, 3,647 Roman Catholics, 4,556 Anabaptists, 2,301 Methodists, etc. Education, which is compulsory, has progressed rapidly. In 1892 an agricultural and veterinary college was established at Copenhagen. There are also 22 other agricultural schools, 67 high schools, 31 Latin schools, a college of pharmacy, 99 commercial schools, various art colleges, and the University of Copenhagen, which has about 1,300 students. The colonial possessions, Iceland, Greenland and islands in the West Indies, have a population (1890) of 114,229 and an area of 86,614 sq. miles.

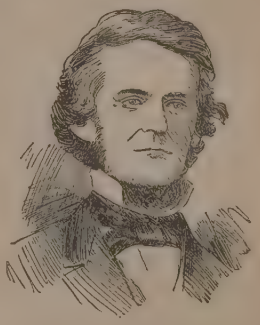
DENNERY or D'ENNERY, ADOLPHE PHILIPPE, a French dramatist of Jewish extraction; born in Paris, June 17, 1811. He was decorated with the Legion of Honor, Dec. 10, 1847, and made officer, Aug. 16, 1859. He produced about 200 pieces from 1831 to 1881, and was the creator of Cabourg, a watering-place in Normandy. Among his dramas are *The Bohemians of Paris* (1842–43); *Marie Jeanne* (1845); *Don César de Bazan* (1849); *Uncle Tom's Cabin* (1853); *Round the World in Eighty Days* (1871); *The Two Orphans* (1875); and *Michael Strogoff* (1880). Died in Paris, Jan. 25, 1899.

DENNEWITZ, a village of Brandenburg, Prussia, 41 miles S.W. of Berlin, where, in 1813, a battle was fought. See AUSTRIA, Vol. III, p. 135.

DENNIE, JOSEPH, an American journalist; born in Boston, Massachusetts, Aug. 30, 1768; died in Philadelphia, Jan. 7, 1812. He graduated at Harvard, and studied law, but made literature his profession. He edited *The Farmer's Museum* of Walpole, New Hampshire; the *United States Gazette*, and founded and edited *The Portfolio* in Philadelphia. Collections of his essays, entitled *The Lay Preacher; or, Short Sermons for Idle Moments*, were published in book-form. Mr. Dennie wrote under the pen-name of "Oliver Old School." He founded the "Tuesday Club," many of whose members were on the staff of *The Portfolio*, and among whom were Charles Brockden Brown and John Quincy Adams.

DENNISON, a village of Tuscarawas County, central eastern Ohio, 28 miles S. of Canton, on the Pittsburg, Cincinnati, Chicago, and St. Louis railroad. It has machine-shops, carshops, and pipe foundries. Population 1890, 2,925.

DENNISON, WILLIAM, an American public man; born in Cincinnati, Ohio, Nov. 23, 1815; died in Columbus, June 15, 1882. He graduated at Miami College in 1835; adopted the legal profession; was elected to the legislature in 1848; was chosen delegate to the first Republican national convention, and in 1860 was elected on the Republican ticket as governor of Ohio, and from 1864 to 1866 was Postmaster-General. As governor he was very active in aiding the Union, and in response to the first call for troops, raised 30,000 men. He was president of the Columbus and Xenia railroad. He was a generous benefactor of Denison College, at Granville, Ohio. His last public appearance was as delegate to the Republican convention of 1880.



WILLIAM DENNISON.

DENS, PETER, a Roman Catholic theologian;

born near Antwerp, at Boom, in 1690; died at Malines, Feb. 15, 1775. He was parish priest of Saint Rumold's, and president of the College of Malines for forty years. His work, *Theologia Moralis et Dogmatica*, is extensively used as a textbook in the Roman Catholic theological schools.

DENSIMETER, an apparatus for determining the relative density of a substance. In one form, made for testing salt-water, it consists of a pair of opposed telescopes, which are mounted on a frame and pointed toward each other. Between them is placed, in a prism, the salt-water to be tested. The refracting power of the water varies in proportion to the strength of the saline solution, and the exact refraction may be found by noting the angle at which the telescopes have to be swung to come into the line of vision.

C. H. COCHRANE.

DENSITY OF THE EARTH. The density of a body is the ratio of its mass when compared with the same bulk of water. Astronomy and the laws of gravitation have furnished the data for ascertaining the density of the earth, which is now assumed to be about five times that of water. See ASTRONOMY, Vol. II, pp. 792, 793; GEOLOGY, Vol. X, pp. 222, 223.

DENTAL FORMULA. See MAMMALIA, Vol. XV, p. 353.

DENTALIUM. See *Scaphopoda*, under MOLLUSCA, Vol. XVI, p. 663.

DENTARIA OR TOOTHWORT, a genus of plants of the family *Cruciferæ*, with white or rose-colored flowers and a toothed rootstock, from which it derives its name. The rootstock is pungent, and was formerly dried and used as a remedy for toothache. Other common names are *pepper-root* and *crinkle-root*.

DENTATUS, MANIUS OR MARCUS CURIUS, a Roman consul noted for his integrity as well as for martial exploits. He was consul with P. Cornelius Rufinus, 290 B.C. He was consul in 275 and 274, and during his three terms of service conquered the Samnites, Lucanians, Sabines and Bruttians. He was censor in 272 B.C., and while in office did much to improve the public works of the Roman domain. He began the Anio viaduct and built the Velinian canal. See TERNI, Vol. XXIII, p. 190. He died 265 B.C.

DENTEX, a genus of marine fishes, resembling the perch, found in Europe. It reaches a large size, and is an important food-fish.

DENTIL. See ARCHITECTURE, Vol. II, p. 463.

DENTINE. See DIGESTIVE ORGANS, Vol. VII, p. 233.

DENTIROSTRES, an artificial group of birds established by Cuvier. It included those forms with notched upper mandible, such as thrushes, warblers and shrikes.

DENTON, the capital of Caroline County, central eastern Maryland, situated on the Choptank River, 53 miles S.E. of Baltimore. It has an academy. Population 1890, 641.

DENTON, a city and the capital of Denton County, northern central Texas, on a tributary of Trinity River and on the Texas and Pacific and the Missouri, Kansas and Texas railroads. The village has manufactories of flour and pottery, and has cotton and oil mills. It is supplied with electricity and has water-works. Population 1890, 2,558.

D'ENTRECASTEAUX ISLANDS, a group off the eastern end of New Guinea, at lat. 10° S., long. 151° E., belonging to Great Britain. The largest is Fergusson; next, Normanby and Goodenough. Area, 1,214 square miles; population, about 12,000.

DENUDATION, IN GEOLOGY. See GEOLOGY, Vol. X, p. 372.

DENVER, a city and the capital of Arapahoe County, central eastern Colorado, and also the capital of the state. It is situated 5,224 feet above sea-level, 12 miles eastward from the foot of the Rocky Mountains, on the south branch of the Platte River, where that stream is joined by Cherry Creek. Denver was settled in 1858 by a party of miners under Green Russell, and by a colony under Gen. J. W. Denver, from whom it received its name. The discoveries of gold, silver and other minerals caused an influx of settlers into the district, of which Denver is the commercial center. A rapid growth increased the population of the city from 4,759 in 1870 and 35,629 in 1880 to 106,713 in 1890.

Denver is a city of great natural beauty, which has been enhanced by broad avenues, lined with beautiful shade-trees, and fine public buildings and parks. Among the public buildings are the State Capitol, a magnificent structure of gray granite; the County Courthouse, City Hall, the United States Government Building, the Tabor Grand Opera House, and a number of beautiful cathedrals and business blocks. The city has, in addition to one of the most complete public-school systems, Denver University; Wolfe Hall, a seminary for young women; Brinker Institute, a collegiate institution for young men; and a number of lesser private establishments. Large public libraries are established at various accessible points.

Denver is primarily a railroad center, as it is the gateway to the mountains of the West, the mining camps of which obtain all supplies from the city, and the summer resorts cause all travelers in the West to make Denver a starting-point. Sixteen distinct railway systems enter the city. Large ore-refining works, and manufactories to the number of about eight hundred and seventy-five are located there. The city public works have made it perhaps the best drained and watered city in the United States. Over two hundred artesian wells furnish the water-supply. All modern rapid-transit systems and an excellent system of lighting are in use.

DENVER, JAMES W., an American lawyer, soldier and politician; born at Winchester, Virginia, in 1818; died in Washington, District of Columbia, Aug. 9, 1892. In 1831 the family removed to Ohio, and in 1841 he went to Missouri, where he studied law and was admitted to the bar. As captain of the

Twelfth Infantry, he served throughout the Mexican War, and in 1850 settled in California, where he was chosen a state senator two years later. His term in the senate was signalized by a duel with ex-Congressman E. Gilbert, fought with Winchester rifles, in which Gilbert was shot dead. Denver became secretary of state for California in 1853, and also Congressman, and under President Buchanan (in 1857) was Commissioner of Indian Affairs. The same year he became governor of Kansas, but resigned in 1858, while holding the governorship, which included the present state of Colorado in its jurisdiction. He was instrumental in founding the city of Denver, named in his honor. In the Civil War he was made brigadier-general, and served until 1863 in the Western states.

DEODATUS. See St. Die, Vol. XXI, p. 161.

DE PAUW, Washington Charles, an American manufacturer and philanthropist; born in Salem, Indiana, Jan. 4, 1822; died in Chicago, Illinois, May 5, 1887. He was a grandson of a Frenchman who accompanied Lafayette to America, to take part in the war for independence. Mr. De Pauw engaged in legal work, milling, the grain business, and in the manufacture of plate glass. He endowed the De Pauw University, at Greencastle, Indiana, to which he gave, at his death, $1,500,000, and he was one of the founders of De Pauw Female College, at Albany, Indiana.

DE PAUW UNIVERSITY, a co-educational institution, at Greencastle, Indiana. It was organized in 1837 by the Methodist Episcopal Church, under the name of Indiana Asbury University. At that time the generous gifts of W. C. De Pauw caused the trustees to change the name to De Pauw University. The school is largely endowed by Mr. De Pauw, who bequeathed it $1,500,000. Its campus comprises about 150 acres. It had, in 1895, 48 persons in the faculty, 783 students and a library of 12,900 volumes. From its organization until 1895, 1,789 had been graduated. The university has an annual income of $55,000. In addition to the regular school of liberal arts, two professional schools, law and theology, are maintained. A considerable amount of post-graduate work is done. Elective studies and courses are permitted.

DE PÈRE, a manufacturing city of Brown County, central western Wisconsin, on the Fox River, 4 miles S. of Green Bay, on the Chicago, Milwaukee and St. Paul railroad. Water-power is obtained by means of a dam across the river, and the city has manufactories of wagons, shingles and woodenware, and contains car-shops, iron-works and a flour-mill. The city has connection with Chicago and Buffalo by means of a line of steamers. Population 1890, 3,625.

DEPEW, Chauncey Mitchell, an American lawyer and railroad president; born in Peekskill, New York, April 23, 1834; graduated at Yale in 1856, studied law, and in a few years was admitted to practice; in 1861–62 a member of the New York assembly. In 1860 he canvassed the state of New York for Abraham Lincoln for President, and in 1863 was elected Secretary of State. Later he held other offices, but resigned them to engage in his profession.

CHAUNCEY M. DEPEW.

In 1866 Mr. Depew became attorney for the Harlem Railroad Company, and in 1869 became counsel for the consolidated New York Central and Hudson River Railroad Company. In 1872 he was defeated as a candidate for lieutenant governor of New York state; in 1874 the legislature appointed him regent of the State University. In 1882 he became second vice-president of the New York Central and Hudson River Railroad Co.; and in June, 1885, was elected president of this road and of the West Shore Railroad Co. Famous as an orator and after-dinner speaker, he became president of the Union League Club and the Yale Alumni Association of New York. Volumes of his speeches have been published; also *One Hundred Years of American Commerce* (1895). On Jan. 18, 1899, he was elected U. S. Senator from New York.

DE PEYSTER, Abraham, an American colonial jurist, son of Johannes de Peyster; born July 8, 1658, in New York City; died there, Aug. 10, 1728. Like his father, he early in life became a merchant and accumulated wealth. From 1691 to 1695 he was mayor of New York; then chief justice and president of the provincial council, acting for a time as governor. The bell which now hangs in the Fifth Avenue Collegiate Church was presented by him to the Nassau Street Middle Dutch Church. He was at one time treasurer of the provinces of New York and New Jersey.

DE PEYSTER, Johannes, an American colonial merchant; born in Haarlem, Holland, in 1600; died in New York City, about 1685. He was of Huguenot descent, from a family driven from France at the time of the St. Bartholomew massacre. Early in the history of New York he emigrated there and engaged in trading. He took an active part in provincial politics until the province passed under the control of the English.

DE PEYSTER, John Watts, an American public man and author; born in New York City, March 9, 1821. A descendant of Johannes de Peyster. Mr. de Peyster became, in 1845, colonel of the One Hundred and Eleventh Regiment, and in 1866 was brevetted major-general of New York militia. He was actively interested in the organization of the fire and police departments of New York City. He has written on military, historical and ethnological subjects. Among his numerous publications are *Life of Field-Marshal Torstenson* (1855); *The Dutch at the North Pole* (1857); *Carausius, the Dutch Augustus* (1858); and *Personal and Military History of General Philip Kearney* (1869).

DEPHLEGMATOR. The principle of all dephlegmators, as used in fractional distillation, is

based on the fact that when a mixture of two liquids of different boiling-points is distilled, the distillate, at all stages of the process, contains both liquids, the more volatile first predominating, and later the other liquid. Le Bel's dephlegmator consists of a tube with three bulbs or enlarged portions, and a vapor-tube at the top leading to the condenser. It is fitted with several baskets of platinum gauze, in which the liquid collects more rapidly than it can run through into the flask to which the apparatus is fitted. The vapor passing through being brought into contact with the condensed liquid, only the most volatile constituents pass into the condenser. The accumulation of liquid in the gauze baskets necessitates the regular removal of the heating apparatus, and in this respect Henniger's dephlegmator is better. It provides side-tubes for conveying the accumulated liquid from bulb to bulb downward, until it is delivered into the flask. Linnemann's dephlegmator is similar to Le Bel's, the only difference being in the position of the bulbs. Glynsky's dephlegmator makes use of hollow glass balls in place of wire-gauze baskets.

C. H. Cochrane.

DEPOSIT, a village of Broome County, southern New York, on the Delaware River, and on the Erie railroad. It is situated partly in Broome County and partly in Delaware County. It has flour and planing mills, and stockyards. Population 1890, 1,530.

DEPOSITION, the testimony of a witness set down in writing, and taken by a judge, or by a commissioner specially appointed by him for that purpose. The depositions are answers to questions generally put by the legal representatives of the parties to the suit, under the control of the court or commissioner, and the answers are taken down by the clerk of court, or by a clerk specially appointed for the purpose. By act of Congress, and by statute in the various states, rules have been provided, permitting the taking of depositions in civil cases, where the witness is sick, aged, about to leave the state, or where he resides at a great distance from the place of trial or outside of the state, and in other cases, where it would be impossible or very inconvenient for the witness to attend the trial. This may generally be done by serving the opposite side with reasonable notice of the time and place of taking the depositions, and by obtaining a commission from the court wherein the cause is pending. In criminal cases depositions cannot be taken without the consent of the accused, as the constitution gives him the privilege of requiring the presence of the witnesses.

DEPPING, Georges Bernard, a French historical writer; born in Münster, Germany, May 11, 1784; died in Paris, Sept. 5, 1853. Although born in Germany, of German parents, he spent his life in France. Among his writings are *A General History of Spain* (1811); *History of Commerce between the Levant and Europe* (1832); and a *History of Normandy* (1835).

DEPRETIS, Agostino, an Italian statesman, born near Stradella, Italy, Jan. 31, 1813; died there, July 20, 1887. He became a lawyer and writer for liberal newspapers, and in 1849 civil governor of Brescia. He became pro-dictator of Sicily in 1861, and in 1862 entered Ratazzi's Cabinet. In 1866 he was Minister of Marine, and after the death of Ratazzi, led the opposition in the Chamber. In 1876–77, again in 1879–81, and in 1881 he was Premier of Italy.

DEPREZ, Marcel, a French engineer; born in Chatillon-sur-Loing, Dec. 19, 1843. He early began the study of mechanics and electricity at the College of Mines, in Paris, and began to investigate the application of electricity as a motive force. In 1882 he succeeded in transmitting power over an ordinary telegraph wire from Munich to Miesbach, a distance of 35 miles, the first recorded instance of the practical long-distance transmission of electrical power. He studied the problem of electro-motors, not only in France, but in Germany, where he interested Baron Rothschild in his work, by whose aid, in 1885, he demonstrated the further practical use of electricity by running trains from Chapelle to Creil, a distance of fifty kilometers. In recognition of what he had done he was elected a member of the Academy of Sciences in 1886, and an officer of the Legion of Honor in 1883. In 1890 he was elected professor of applied electricity in the French Conservatory of Arts and Mechanics.

DE PROFUNDIS (Lat., "Out of the depths"), the first words of the 130th Psalm, which form a portion of the liturgy of the Roman Catholic Church, and are sung when the bodies of the dead are committed to the grave. It is one of the seven "penitential psalms."

DEPUTY, one appointed by a ministerial officer to exercise the functions of the officer appointing him. A deputy is usually required to take the oath of office, and his acts are of equal force with those of the officer himself. He must act in the name of the officer under whom he is appointed. Sheriffs, marshals, clerks of courts and other ministerial officers are generally authorized to appoint deputies, and are liable for the acts of a deputy performed by him as deputy, or for his neglect. Special deputies are those appointed as deputy for some particular act.

DERAH or DIRAA, an Egyptian unit of measure, of interest as connected with recent conjectures concerning the pyramids. This measure is subdivided into kadam (one half), abdat, (one sixth), and kerat (one twenty-fourth). See also Weights and Measures, Vol. XXIV, p. 491.

DERBY, a manufacturing village and railroad junction of New Haven County, southwestern Connecticut, at the confluence of the Housatonic and Naugatuck rivers, and on the New York, New Haven and Hartford railroad. It was formed from the borough of Birmingham and the village of Derby in 1894. Population, about 7,500.

DERBY, Earls of. See Man, Isle of, Vol. XV, p. 454.

DERBY, Edward Henry Smith Stanley, Earl of, the fifteenth of the title, a British statesman; born in Knowsley, England, in July, 1826; died there, April 21, 1893. He entered Parliament in 1848; in 1852 was appointed Under-Secretary for the Colonies, during the first premiership of his father. During his father's second premiership he was Colonial Secretary, Secretary of State for India and Secretary for Foreign Affairs. He was opposed to an active war policy. While Secretary for India he brought about the transfer of that empire from the East India Company to the crown. He became Minister of Foreign Affairs for the second time, under Disraeli, in 1874, but resigned in 1878 on account of differences with the Prime Minister. He had been until this time a Conservative, but now joined the Liberals, and became Colonial Secretary under Gladstone in 1886. He could not agree with Gladstone's home-rule ideas, and, resigning, joined the Liberal-Unionists in the same year, 1886. He took no further leading part in politics. In addition to his political work, Lord Derby took an active interest in educational institutions in London, and was a promoter of many charitable organizations.

DERBY, Elias Hasket, an American merchant; born in Salem, Massachusetts, Aug. 16, 1739; died there, Sept. 8, 1799. His father was a ship-owner, and the son continued in the business and greatly extended it. He sent trading-vessels to Russia, the East Indies and China. He contributed $10,000 toward the establishment of the American navy (1798) and loaned supplies and ships to the national government. He was, beyond a doubt, the wealthiest man in the United States during the eighteenth century. He was especially active in equipping privateersmen during the Revolution. In order to do so, he was obliged to construct large shipyards at Salem. He furnished the supplies for the French fleet.

DERBY, Elias Hasket, an American merchant and ship-owner, son of the preceding, was born in Salem, Massachusetts, Jan. 10, 1766; died in Londonderry, New Hampshire, Sept. 16, 1826. He was the first importer of merino sheep into this country, and the first manufacturer of broadcloth in Massachusetts. He was in command of that one of his father's vessels which was the first American ship to enter Calcutta and Bombay.

DERBY, Elias Hasket, an American lawyer, son of the preceding; born in Salem, Massachusetts, Sept. 24, 1803, died in Boston, Massachusetts, March 30, 1880. He was engaged in the construction of railroads, assisted in the completion of the Hoosac tunnel, and in the building of ironclads during the Civil War. He was a contributor to the *Edinburgh Review* and the *Atlantic Monthly*. He was a counselor of high reputation, and on account of his ability was selected by the United States government in 1867 to act as commissioner in the negotiations with Great Britain in regard to the fisheries questions.

DERBY, Frederick Arthur Stanley, Earl of, the sixteenth of the title, an English statesman; born in London in 1841; created Baron Stanley of Preston in 1886, and succeeded his brother as Earl of Derby in 1893. He was educated at Eton, and from 1858 to 1865 served in the army. He entered Parliament from the Preston district of Lancashire in 1865, and has held the following offices as a Conservative: Financial Secretary for War, 1874–77; Secretary of State for War, 1878–80; Secretary of State for the Colonies, 1885–86; president of the Board of Trade, 1886; and Governor-General of Canada, 1888–93. He married the eldest daughter of the Earl of Clarendon in 1864.

DERBY, George, an American surgeon and hygienist, nephew of the second Elias Hasket Derby; born in Salem, Mass., Feb. 13, 1819; died in Boston, Massachusetts, June 20, 1874. He was graduated at Harvard College in 1838; entered the Union army as surgeon, and gained a high reputation as a sanitarian. He served for four years in the army, attaining the rank of lieutenant-colonel of volunteers. In 1872 he was appointed professor of hygiene at the Harvard Medical College.

DERBY, George Horatio, an American army officer and humorist; born April 3, 1823, in Dedham, Massachusetts; died May 15, 1861, in New York. He served in the Mexican War (1846–47), and received the brevet of first lieutenant. From 1847 to 1860 he was on various surveys and explorations in Minnesota, California, Texas and other states. He was afterward employed in the coast survey, and had charge of the erection of many of the lighthouses of the Atlantic coast, He was the author of many humorous effusions, published under the name of "John Phœnix." Among them are the *Squibob Papers* (1859).

DERBY, Orville Adelbert, an American geologist; born in Kellogsville, New York, July 23, 1851. He was graduated at Cornell University in 1874. He was a member of several collecting parties in Brazil in 1870–71, and after spending a few years as instructor at Cornell, entered the service of Brazil in 1875 as a member of the geological commission of that country. He became curator for the Brazilian National Museum, and in 1885 chief of the São Paulo geological survey. He is recognized as an authority on Brazilian geology.

DERCYLLIDAS, a Spartan general in the employ of the Asiatic Greeks, 399 B.C. He succeeded Thimbron, and was superseded by Agesilaus in 396 B.C. He was given command of an army to protect the Asiatic Greeks from the Persians. He was successful, and during his term of office captured Atarneus and conquered nine cities of Æolia.

DERELICT, a term, in law, signifying anything forsaken or left unoccupied, or willfully cast away. Where the sea has receded from the shore, the land thus left uncovered is styled derelict. The most common use of the term is its application to a ship which has been wrecked, and has been abandoned by the master and crew without hope of recovery. The mere quitting of a ship for the purpose of procuring assistance from the shore, or other temporary cause, with

the intention of returning to her again, does not make her derelict.

DERENBOURG, HARTWIG, a French Arabist, son of the following; born in Paris, June 17, 1844. He received the degree of doctor of philosophy from Göttingen University in 1864. He was employed in the French National Library, in the department of manuscripts, from 1866 to 1870. In 1870 he was placed in charge of the courses in Arabic at the College of Oriental Languages, and in 1879 was made professor there. Since 1887 he has been in charge of the department of religious knowledge. Among his writings are *Notes on Arabic Grammar* (1873); *The Science of Religions and Islamism* (1886); and *Literary History of the Old Testament*, a translation (1873).

DERENBOURG, JOSEPH, a French Hebrew scholar, father of the preceding; born in Mayence, Aug. 21, 1811; studied at the universities of Giessen and Bonn, taking his degree at the former. He studied at Paris under Quatremere, Reinaud and Perceval. In 1856 he became reader of Oriental texts for the National Bureau of Printing. In 1871 he was elected a member of the Academy of Belles-Lettres. In 1877 he became director of Semitic languages in the College for Practical Higher Studies. Among his published works are *Two Hebrew Versions of the Lives of Kalilah and Dimnah* (1881); *A History of Palestine* (1867); and a number of other works on kindred subjects.

DE RESZKE, JEAN, a Polish tenor singer; born in Warsaw, Poland, Jan. 14, 1852. He made his *début* in 1874 at Venice. He began as a baritone, but in 1879 came out as a tenor, and as such made a reputation that entitles him to rank foremost among the tenors of his time. He sang at Drury Lane in 1874, and afterward throughout Europe, and in 1891–92 and again in 1896 in United States with the Metropolitan Opera Company.— His brother, EDOUARD DE RESZKE, was born in Warsaw, Poland, Dec. 23, 1856. He began his operatic career under the auspices of his brother, Jean, in Paris, in 1876, at the Théâtre Italien; then in Italy with the Royal Italian Opera Company, and with the French Opera. In 1896 made a successful visit to the United States with the Metropolitan Opera Company. In many of the French, Italian and German operas he sustained leading parts, and established a reputation in the minds of many critics as being the best lyric actor and bass singer on the stage.

JEAN DE RESZKE.

DERG, LOUGH. See DONEGAL, Vol. VII, p. 362.

DERMATOLOGY. See MEDICINE, Vol. XV, p. 797.

DERMATOPHYTA. See VETERINARY SCIENCE, Vol. XXIV, p. 206.

DERMESTES, a genus of small beetles, some of which are great pests in houses, storerooms and museums. Together with their larvæ, they feed on dry animal and vegetable substances. Furs, woolens, silk and feathers, are often injured. These insects are cosmopolitan.

DERMOPTERA. See MAMMALIA, Vol. XV, p. 401.

DE ROSNY, LEON LOUIS LUCIEN, a French ethnologist and Orientalist; born in Loos, Aug. 5, 1837. He has been a constant and active student of the Oriental languages, especially the Japanese. He has been, to a large extent, instrumental in the organization of the society for the study of American ethnology. He was an attaché of the French Department of Foreign Affairs, in the capacity of interpreter. Since 1886 he has been one of the directors of the College for Higher Study. Among his numerous publications are *An Introduction to the Study of the Japanese Language* (1856); *A Japanese-French-English Dictionary* (1858); and *The Religion of Japan* (1881).

DÉROULÈDE, PAUL, a French writer and politician; born in Paris, Sept. 2, 1846. He first attracted public attention as a writer of patriotic songs. He took part against the Commune in 1870. He next attempted dramatic writing and produced several popular plays. But it is on account of his political actions that he is best known in France. He joined the Boulanger movement, and as chairman of the Patriotic League took a prominent part in all the events which led up to the exile of Boulanger. He had by that time succeeded in being elected to the Chamber of Deputies, and in 1890 attempted to impeach the member who took the seat of Boulanger, and was himself temporarily suspended from the Chamber. He returned to literature, traveled in Italy, and wrote a romance before he again resumed his seat in the Chamber. Among his writings are *Songs of the Soldiers; National Education* (1882); and his romance, *History of Love* (1890).

DERRICK, a form of hoisting-machine often confused with the crane, which it very much resembles. Its peculiar feature, which distinguishes it from other similar machines, is that it has a boom stayed from a central post, which is usually stayed by guys. In its capstan, or winch, it resembles the crane, but in its double set of tackles, one for the load and the other for the boom, it differs from that machine. See CRANE, Vol. VI, p. 547.

DERVISH PASHA, a Turkish statesman and soldier; born at Eyaub, near Constantinople, in 1817, and is considered the first of living Turkish statesmen. He was sent to England and France to study engineering, and when he returned to Turkey in 1842, became chief of the Keban mines and professor of physics and director of the Constantinople Military School. He was for several years employed in the diplomatic service in Persia and the neighboring principalities. He was appointed general of division, and as such served in the war against

Russia in 1878, taking an active part in the defense of Batoum. The siege was effectually resisted, but it was stipulated by the treaty of peace that Batoum should be ceded to Russia. The civil governor of Batoum, however, incited by the Lazis, refused to surrender it to the enemy, and it became the task of Dervish Pasha to put down the Lazis and to deliver Batoum over to the Russians. Two years later he was called upon to perform a very similar act in the case of Dulcigno and the Albanians. He was the sultan's special commissioner to Egypt in 1882.

DERWENTWATER. See CUMBERLAND, Vol. VI, p. 699.

DERWENTWATER, JAMES RADCLIFFE, EARL OF; born June 28, 1689, in Northumberland; grandson of Charles II of England; was one of the leaders of the rebellion of 1715. He was taken prisoner at Preston, and conveyed to the Tower of London; at his trial in Westminster Hall he pleaded guilty and threw himself upon the mercy of the king, but his appeal was rejected and he was beheaded on Tower Hill, Feb. 24, 1716. He was the last earl of Derwentwater.

DERZAVIN, GABRIEL ROMANOWICZ, a popular Russian lyric poet; born July 14, 1743, in Kazan, Russia; died July 21, 1816, at Svanka, Russia, near Novgorod. See RUSSIA, Vol. XXI, p. 106.

DESAGUADERO, the name applied to that part of the largest tributary of the Colorado River, in the Argentine Republic, which lies between Lake Silvero and the mouth of the Tunuyon River. It flows southward, separating the states of San Luis and Mendoza. This section of the river is about eighty miles in length.

DESAGUADERO, the name given to the great valley formed by the dividing of the Andes into two great chains, extending from lat. 13° S. to lat. 23° S., in Peru and Bolivia. It is drained by the lakes Titicaca and Andamarca and their tributaries. It is over 12,000 feet above the sea, the most elevated plateau in the world excepting Tibet. The land is rich in grains and grasses, and has considerable silver, copper and tin ore. The river connecting the two great lakes of the plain is 200 miles in length, and takes its name from the plain.

DE SANCTIS, FRANCESCO, an Italian author, educator and statesman; born March 28, 1817, in Morra Iripino; died Dec. 29, 1883, in Naples. He began his active life as a teacher in Naples, but soon incurred the censure of the government, on account of his political utterances, and was imprisoned for three years, and afterward banished. He returned to Naples in 1860 and engaged in teaching again, but continued his political work more actively than before. He was appointed Minister of Public Instruction. He was a ready writer and speaker. Chief among his published writings is *History of Italian Literature.*

DE SANCTIS, LUIGI, an Italian religious reformer; born Dec. 31, 1808, in Italy; died in Florence, Dec. 31, 1869. He became a Catholic priest, and as such held a professorship in the Theological School at Rome. He renounced the Catholic religion and joined the Protestants in 1847. He became a leader in the Protestant movement at Florence, established there the Protestant periodical *Eco Della Verita*, and was chosen professor of theology at the Florence Waldensian Seminary.

DESCARTES'S RULE OF SIGNS. See ALGEBRA, Vol. I, p. 545.

DESCENT, the hereditary succession to the title to property. Title by descent is the title which one takes, by operation of law, in the estate of a deceased person as the heir of such person. According to the principles of the ancient feudal system of England, under which much of the common law was developed, the right to the use of land upon the death of a tenant always descended to his issue; hence the term *descent* is applied to any title by inheritance, although, by statute, in many states of this country, the title is sometimes made to ascend. The English rule of primogeniture, whereby the eldest son inherits all the real estate, has been universally abolished in this country, and by statutory provisions of the various states the estate of the parent descends to his issue, both male and female, in equal shares. The rules of descent do not apply to personal property, and this class of property passes to the executor or administrator, by whom the residue, after payment of the debts of the deceased, the costs of administration, and the dower interest, if any, is distributed in equal shares among the heirs. The rules governing descent in the various states are provided by statute, and follow much the same general principles, but differ widely in detail. See INHERITANCE, Vol. XIII, p. 77.

DESCHAMPS, EMILE, a French poet; born at Bourges, France, Feb. 20, 1791; died in April, 1871, at Versailles. He, with Victor Hugo and others, organized the *Muse Française* in 1827. He was a constant writer and contributor to the journals of his time. His first works of merit were two comedies, *Selmours et Floriau* and *Le Tour de Faveur*, in 1818. He afterward published *French and Foreign Studies* (1828) and *Poems* (1840).

DESCHANEL, ÉMILE AUGUSTIN ÉTIENNE, a French educator and writer, member of the Senate; born in Paris, Nov. 14, 1819. He became professor of rhetoric at the Normal College. He afterward edited, successively, *La Revue Indépendante*, *La Revue des Deux Mondes* and *Le National.* He became interested in the socialism of the time, and for a work on *Catholicism and Socialism*, in 1850, was deprived of his office in the college, and the next year exiled. He lived in Brussels until 1859, when he returned to France and devoted himself to literature, in connection with Victor Hugo. He was elected to the Chamber of Deputies in 1876 and to the Senate in 1881, and became professor of modern literature in the College of France. Among his collected writings are a number of papers on conversation and society, and in a more serious vein, *The Works of Aristophanes* (1867); *Benjamin Franklin* (1882); *The Romanticism of the Classics;* and the *Theater of Voltaire* (1886).

D'ESCLOT, Bernat, a Spanish prose writer of the thirteenth century. The date of his birth is a matter of conjecture, as well as the time of his death. The one work which causes him to be remembered was written in 1285, and under the title *Cronica del Rey en Pere* is an account of the reign of Pedro III. It is the oldest example of Catalan literature, and for that reason, if for no other, is of great value.

DESERT. See Sahara, Vol. XXI, p. 149; Gobi, Vol. X, p. 712.

DESERTION, in criminal law, is the offense of abandoning public service in the army or navy. In the United States, any soldier who is guilty of desertion in time of peace is liable to serve for such unexpired period of the term of his enlistment as still remained at the time of his desertion, and may be tried by court-martial and punished in any manner except by death. In time of war, any soldier who has been duly enlisted or has received pay in the army of the United States, and who deserts the service, is subject to the penalty of death, or such other penalty as the court-martial shall direct. The rules as to desertion in the United States navy are much the same. Desertion, in the law of domestic relations, generally refers to the act of a man in abandoning his wife or children. In case of desertion the courts have power to grant alimony to the wife or children, and compel the payment thereof by the husband. Desertion is also ground for divorce, but usually only when continued for such time as the statute may fix. In some states desertion is an offense for which the courts may inflict punishment. See Divorce and Marriage, in these Supplements.

DESGENETTES, Nicolas René Dufriche, a French military surgeon; born in Alençon, May 23, 1762; died Feb. 3, 1837. He was chief of the medical corps of the army of Italy in 1795–96, and of the Grand Army of the Empire until the battle of Waterloo. He was dismissed from his position in the army at the Restoration, and shortly afterward was obliged to give up a professorship in the College of France. He was, however, restored, in part, by his election in 1832 to the position of physician of the Invalides. He wrote a number of medical treatises, one of which, *The Medical History of the Army of the East* (1802), is valued to-day.

DESIMA, Island. See Nagasaki, Vol. XVII, p. 164.

DESMAN, the common name for the two muskshrews of the genus *Myogale*, found in Europe. They resemble a small muskrat. See Mammalia, Vol. XV, p. 403.

DESMIDIACEÆ or DESMIDS, a family of one-celled green Algæ, abundant everywhere in fresh waters. The cells are mostly divided into symmetrical halves by a constriction in the middle, or there is at least a symmetrical division of the protoplasmic contents. They multiply by division, sometimes remaining in long filaments, or, by conjugation, they form zygospores. They are of many beautiful forms and markings.

DES MOINES, a city of Iowa, capital of the state and of Polk County (see Vol. VII, p. 130). Having four trunk lines of railway, besides other shorter lines, its traffic facilities are unsurpassed by any other city in the state. For local transportation there are fifty miles of electric-railway trackage and eighty miles of motor-railway trackage. Among the principal public buildings are the United States Federal Court and Post-Office Building, a marble edifice costing $385,000, and the State Capitol, an imposing and commodious structure costing nearly three million dollars. The Young Men's Christian Association has erected a building at a cost of $75,000. The State Agricultural Society has purchased 260 acres of land within the city limits for a permanent location of the Iowa State Fair, upon which it has expended, for the improvement of the ground and the erection of permanent exhibition buildings, $135,000. There are forty public schools, and numerous private schools of high order. The Catholics and Hebrews have each parochial schools, and the Des Moines College (Baptist), the Drake University, Callanan College and the Highland Park Industrial College are located here, and two excellent business colleges. The state library contains 40,000 volumes, and the public library 10,000 volumes. The city is the center of one of the most productive coal areas of the state, there being 29 mines within or near the city limits, from which the output in 1889 was 659 tons. The principal industrial enterprises are mining, pork-packing and the manufacture of glucose and alcohol. In 1890 there were 297 manufacturing establishments, with an invested capital aggregating about $2,800,000, and employing over 3,000 workmen. The city enjoys an extensive wholesale trade. Population 1890, 50,067; 1895, 56,369.

DESMONCUS, a tropical American genus of climbing palms, like the rattans of the East Indies. They have alternate pinnate leaves, with long, hooked spines.

DESMOND, Earls of. See Ireland, Vol. XIII, pp. 260, 264, 265.

DE SOTO, a city of Jefferson County, central eastern Missouri, 45 miles S.S.W. of St. Louis, on the St. Louis, Iron Mountain and Southern railroad. Lead and zinc are mined here, and the city exports these products and grain in large quantities. Population 1890, 3,960.

DE SPENSER, Hugh. See Edward II, Vol. VII, p. 683.

DESSALINES, Jean Jacques, a Haitian emperor; born in Guinea, Africa, 1758; died in Haiti, Oct. 17, 1806. He was the slave of a French planter, whose name he afterward assumed. He fought in the revolutionary wars of Haiti, becoming adjutant-general under the negro commander, Jean François, and afterward joining Toussaint L'Ouverture, when the latter united with the French. He became lieutenant-general, fought the mulatto chief Rigaud, winning a name for energy, dissoluteness and brutality. When peace was declared he was appointed governor of the south part of Haiti. His administration

was marked by cruelty to the negroes; the cold-blooded murder of Toussaint's nephew; friendliness with the French forces, which was afterward followed by a war of extermination upon them. When the French had been expelled from the island (1804), Dessalines was made governor-general for life. At first he ruled wisely, but he soon evinced his disposition by ordering a massacre of all the white inhabitants. He had himself crowned emperor of Haiti, taking the title of Jean Jacques I. He became more despotic than ever, concentrating all power within his own hands, and killing every person of whom he was suspicious. An insurrection arose in 1806, and he was killed by his officers. See HAYTI, Vol. XI, p. 545.

D'ESTRÉES, GABRIELLE. See ESTRÉES, GABRIELLE D', in these Supplements.

DETAILLE, JEAN BAPTISTE EDOUARD, a French military painter; born in Paris, Oct. 5, 1848. He studied under Meissonier. His first exhibition was in the Salon of 1867, with *A Corner of the Workshop*. This did not bring out the commendation evoked by his *Halt of the Infantry* in 1868. His *Repose During the Drill* and *An Engagement Between the Cossacks and Guards of Honor* gave him a high reputation, and prepared the way for the honors accorded him for his *Retreat* (1873), *Salute to the Wounded* (1877), and *The Passing Regiment* (1874), works executed after the war of 1870 had afforded him ample opportunity for the study of soldiery.

DETAINER. See FORCIBLE ENTRY AND DETAINER, in these Supplements.

DETERMINANTS. See ALGEBRA, Vol. I, p. 516; and HEREDITY, in these Supplements.

DETERMINISM. See SCHOLASTICISM, Vol. XXI, p. 429.

DETINUE, a legal term meaning a form of action which may be maintained against a person for the recovery of personal property which came lawfully into his possession, but which he unlawfully detains, together with the damages which the plaintiff may have suffered by reason of such unlawful detention. It is distinguished from the action of replevin, which can be maintained when the possession of the property was unlawful from the beginning. Like replevin, the action of detinue can only be maintained for such goods as may be fully identified and distinguished from such other goods as may be found with them.

DETMOLD, CHRISTIAN EDWARD, a German-American civil engineer; born in Hanover, Germany, Feb. 2, 1810; died in New York City, July 2, 1887. He was educated in Germany, and moved to the United States in 1826. He led an active business life, and took high rank among his fellows. He made drawings for the first locomotive built by Kemble in New York, superintended the erection of Fort Sumter, built the New York Crystal Palace, invented the method used in obtaining spiegeleisen from zinc residue, and was interested largely in coal-mining.

DETMOLD, WILLIAM, a German-American surgeon; born in Hanover, Germany, Dec. 27, 1808; died in New York City, Dec. 26, 1894. He settled in New York in 1837, and developed orthopædic surgery in the United States; he also gave his voluntary aid as army surgeon during the Civil War, and invented an improved knife for the use of one-armed men, which is known as the "Detmold knife." He was connected with many of the New York benevolent societies, and was a constant contributor to medical journals.

DE TROBRIAND, PHILIPPE REGIS, a Franco-American soldier; born near Tours, France, June 4, 1816. He was educated in his native country, and went to America in 1841, where he was successively engaged in the publication of the *Revue du Nouveau Monde* and the *Courrier des États-Unis*, two French newspapers. When the Civil War broke out he enlisted on the Northern side, and fought at Yorktown, Williamsburg, Fredericksburg, Chancellorsville, Gettysburg, Petersburg, and in several other important battles. He was brevetted brigadier-general; in 1867, assigned to the district of Dakota as colonel in the regular army, and later to those of Montana and Green River. He was in command in Louisiana during the post-reconstruction period of 1874. In 1879 he was retired from service at his own request, being 63 years of age. He published, in French, the *Campaigns of the Army of the Potomac* (1882). Died at Bayport, N. Y., July 15, 1897.

DETROIT, the largest and most important city of Michigan, and the capital of Wayne County. For situation and general description, see Vol. VII, p. 133. The city increased in population from 21,019 in 1850, to 205,669 in 1890, and to 237,837 in 1895. Detroit maintains its position among the most important of the lake ports. It is an important port of entry and customs office. Its docking facilities for vessels are among the best on the Great Lakes. Its marine traffic, which in 1873 amounted to nine million tons, had grown to twenty-nine million tons in 1895. From 1890 to 1896 many important municipal enactments, involving the rights of corporations, attracted general attention to Detroit. The manufacturing interests of the city are large. In 1891 there were 1,744 distinct establishments, giving employment to over 38,000 persons. The features which have given Detroit a prominent place among the large cities of the United States, and for which it is noted, are its system of parks and boulevards and its cleanliness. The latter attribute might be called an unavoidable one, as the gentle rise of the ground from the river inland affords a natural system of drainage. This has, however, been augmented by a perfect sewerage system, so that Detroit is the best-drained city of its size in the United States. The system of parks, the largest of which is Belle Isle, a beautiful park of over seven hundred acres, presents an appearance equaled by few cities. Commanding the city and the river is Fort Wayne, designed to be one of the principal fortifications on the northern frontier of the United States.

DETROIT, a city and the capital of Becker

County, western Minnesota, on Detroit Lake, and on the Northern Pacific railroad. It is in a farming district, and is chiefly engaged in handling produce. Population 1895, 1,801.

DETROIT RIVER. See ST. LAWRENCE, Vol. XXI, p. 179.

DÉTROYAT, PIERRE LÉONCE, a French naval officer and journalist, born in Bayonne, Sept. 7, 1829. After his graduation from the Naval College in 1845, he took part in the Crimean and Chinese wars, and was decorated with the cross of the Legion of Honor for his services. He afterward took part in the Mexican campaign; was detailed to the staff of Maximilian and to accompany the Empress Charlotte to France. Trouble with the government caused him to resign his commission. He served during the Franco-Prussian war. Devoting his time mainly to journalism, he edited successively *La Liberté*, *Le Bon Sens*, and *L'Estafette*, and published *The Court of Rome and Emperor Maximilian* (1868) and *French Intervention in Mexico* (1868), etc. Died in Paris, Jan. 19, 1898.

DETTINGEN, a town of western Bavaria, 18 miles E. of Frankfort. Here, on the 27th of June, 1743, the "Pragmatic army," consisting of Austrians, Hanoverians and English, under George II, defeated a force of French under Marshal Noailles, which was their superior in numbers. This was the last battle in which an English king took personal command. See FRANCE, Vol. IX, p. 586.

DEUTZIA, a genus of Asiatic shrubs, belonging to the family *Saxafragaceæ*. They bear numerous panicles of white flowers, and the under surface of the leaves, branchlets and calyx are covered with stellate hairs or scurf. *D. gracilis*, *D. crenata* and *D. scabra* are common species in cultivation.

DEVA. See ZOROASTER, Vol. XXIV, p. 821.

DEVENS, CHARLES, an American jurist; born in Charlestown, Massachusetts, April 4, 1820; died Jan. 7, 1891. He was graduated at Harvard in 1838, and studied law at Cambridge. He was United States marshal for the district of Massachusetts when the fugitive slave, Thomas Sims, was demanded by his master, and, notwithstanding public sentiment, delivered the slave to the owner. Failing in an attempt to purchase the negro's freedom, he assisted him pecuniarily after his emancipation. Mr. Devens served during the Civil War, was wounded at Ball's Bluff, Fair Oaks and Chancellorsville, and at the end of the war was brevetted major-general for gallant conduct at Richmond. He resumed legal practice in 1866, and was appointed justice of the supreme court of Massachusetts in 1873, but resigned this office to act as Attorney-General under President Hayes, resuming it at the end of that administration, and continuing to fill the position until his death.

DE VERE, SIR AUBREY, an Irish poet, the son of the first baronet De Vere; born at Curra Castle, Ireland, in 1788; died there, in 1846. He wrote little until he was 30 years of age, when he published two dramatic poems, *The Duke of Mercia* and *Julian the Apostate*, and subsequently produced several songs; among them, *The Song of Faith*.

DE VERE, SIR AUBREY THOMAS, Irish poet, born Jan. 10, 1814, at Curra Castle, Ireland. He began to write poetry at an early age, his productions attaining considerable popularity. In 1854 he became honorary professor of political and social science in the Roman Catholic University of Dublin. Among his writings are *Waldenses* (1842), a lyrical tale; *The Search After Proserpine*, a metrical description of his travels in Greece; *Legends of St. Patrick* (1872); and a number of critical essays under the titles *Essays on Poetry* (1887); and later, *Essays Ethical and Literary*. His latter works were a volume of *Poems* (1890) and *Religious Poems of the Nineteenth Century* (1893).

DE VERE, MAXIMILIAN SCHELE, an American philologist; born in Vexiö, Sweden, Nov. 1, 1820. He was educated in Prussia and studied law in Rome. He moved to the United States in 1842, and in 1844 was made professor of modern languages in the University of Virginia. He published many important works on philology and historical subjects; among them may be mentioned *Outlines of Comparative Philology* (1851); *Romance of American History* (1872); *The English of the New World* (1873); and *Myths of the Rhine* (1874), which was illustrated by Gustave Doré. He edited many language textbooks and became a prominent member of the American Philological Society.

DEVEREUX, JOHN HENRY, an American railroad president; born in Boston, Massachusetts, April 5, 1832; died in Cleveland, Ohio, March 17, 1886. He was engaged in railroad engineering in Ohio and Tennessee until the beginning of the Civil War, when he was appointed superintendent of the military railroads of the Union army. This position he held until 1864, when he resigned to return to Ohio. In 1873 he was chosen president of the Cleveland, Columbus, Cincinnati and Indianapolis railroad; in 1874, of the Atlantic and Great Western; in 1880, of the Indianapolis and St. Louis. His name is especially remembered in railroad circles on account of the determined stand he took in the "strike" of 1877, when he prevented over eight hundred of his men from joining the strikers.

DEVIATION OF THE PLUMB-LINE, a physical phenomenon, the explanation of which is, to a large extent, a matter of conjecture. The phenomenon is, that the plumb-line at some points on the earth's surface is drawn out of the perpendicular. It is thought by some to be due to the attraction of mountains, or large masses of earth, in the vicinity of which the deviation has been noted to occur, but a similar deviation has been noticed on level prairies. The conclusion reached by authorities in geodesy is, that wherever a deviation is noticed, near that point are located large masses of the earth which are of greater density than the earth surrounding them.

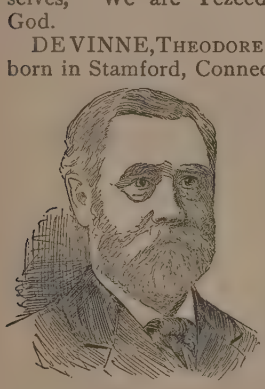
DEVIL'S COACH-HORSE. See COLEOPTERA, Vol. VI, p. 131.

DEVIL'S LAKE, the name of a body of water

and of a small village in the northeastern part of North Dakota. The village is on the Great Northern railroad, 90 miles N.W. of Grand Forks, and is the capital of Ramsey County. The lake, formerly known as Minne-Wakan, forms the boundary between Benson and Ramsey counties. It is 40 miles long, about 10 miles wide, and its surface is 1,467 feet above sea-level. It has no visible outlet, and its waters are saline. Population 1890, 846.

DEVIL-WORSHIPERS OR YEZEEDEES, a tribe of the Kurds in Mesapotamia, who believe that while God is supreme, the Devil is a mighty angel, ultimately to be restored to heaven, and hence deserving of reverence. They accept the Old Testament and revere the New Testament and the Koran. It is thought by some that their religion is evolved from Zoroastrianism. They are nomadic, and are said to number over 200,000. They practice infant baptism, allow circumcision, adopt monogamy, permitting divorce only in cases of adultery. The ministry consists of four orders: *Pirs*, or saints; *Sheikhs*, or chief officers, *Cawals*, or ordinary priests; and *Fakirs*, or deacons, engaged in inferior ministrations. They reverence the sun and fire, and say of themselves, "We are Yezeedees"; i.e., worshipers of God.

DEVINNE, THEODORE LOW, an American printer; born in Stamford, Connecticut, Dec. 25, 1828. He took up his residence in New York City in 1849, and ten years later became partner of his employer, Francis Hart, whom he succeeded in business. *St. Nicholas* from its first issue, in 1873, and the *Century* since 1874, were printed at the De Vinne Press, and among other works might be mentioned the *Century Dictionary*. He has done much for the improvement of typography, and is noted for the excellence of his presswork and woodcuts. He is a member of the Typothetæ, the Authors' Club, the Grolier Club; is a contributor to current literature, and has published *Printer's Price List* (1871); *Invention of Printing* (1876), and *Historic Types* (1886).



THEODORE L. DE VINNE.

DEVONIAN AGE. See GEOLOGY, Vol. X, p. 340.

DEVONSHIRE, SPENCER COMPTON CAVENDISH, DUKE OF, and Marquis of Hartington, a British statesman, son of William Cavendish, Duke of Devonshire; born July 23, 1833. He was graduated at Trinity College, Cambridge, in 1854, and almost immediately entered the diplomatic service. He was elected to the House of Commons in 1857, since which time he has occupied a prominent place among British politicians. He was appointed Lord of the Admiralty in 1863; Under-Secretary of War the same year; in 1866, Secretary of War, in Lord Russell's administration; Postmaster-General under Mr. Gladstone in 1868; in 1871, Chief Secretary for Ireland until 1874, under Mr. Gladstone; chosen leader of the Opposition in 1875; elected Lord Rector of the University of Edinburgh in 1877; Secretary of State for India in 1880–82; and Secretary of War from 1882 to 1885. Late in 1891, he succeeded his father as Duke of Devonshire. In 1892 he was installed Chancellor of Cambridge University. In June, 1895, he entered Lord Salisbury's Cabinet as Lord President of the Council.

DEVONSHIRE, WILLIAM CAVENDISH, DUKE OF, born April 27, 1808; died in Milnethorpe, Dec. 21, 1891. He was the seventh Duke of Devonshire, succeeding to the title in 1858. Although a member of the House of Commons, and, later by accession to the title, of the House of Lords, he never took a prominent part in politics, devoting himself to business and the manufacture of iron. Possessed of one of the largest estates in England, he was able to carry out large plans, and thereby greatly benefit the industries of the country. The towns of Eastbourne and Barrow-in-Furness are mainly of his building.—His son, LORD FREDERICK CHARLES CAVENDISH, an English statesman, was born at Eastbourne, Sussex, Nov. 30, 1836. He was private secretary to Lord Granville from 1859 to 1864; sat in Parliament for several years; was private secretary to W. E. Gladstone from 1872 to 1873; and financial secretary of the Treasury from 1880 to 1882. Then, as Gladstone's olive branch to Ireland, he was appointed chief secretary to the Lord Lieutenant, but was assassinated, with Under-Secretary Burke, in the Phœnix Park, Dublin, within a few days of his landing, May 6, 1882. His brutal murder excited the indignation of the civilized world, for his qualities had endeared him to many people.

DEW. See METEOROLOGY, Vol. XVI, pp. 120, 121.

DEWDNEY, EDGAR, a Canadian statesman; born in Devonshire, England, in 1835. He entered the service of Canada in 1859 as a civil engineer, and was assigned to duty in British Columbia. He entered politics and was elected to the local parliament in 1868, and to that of the Dominion in 1872. He was appointed Indian commissioner in 1879; lieutenant-governor of the Northwest in 1881; Minister of the Interior and Superintendent-General of Indian Affairs in 1888; and in 1892, governor of British Columbia.

DEWEES, WILLIAM POTTS, an American physician; born in Pottsgrove, Pennsylvania, May 5, 1768; died in Philadelphia, May 18, 1841. He studied medicine at the University of Pennsylvania, and began to practice at Abington. The yellow fever depleted the ranks of Philadelphia physicians in 1793 and Dr. Dewees removed to that city. He won distinction in the department of obstetrics, and in 1826 was appointed to a professorship of obstetrics and diseases of women and children in his *alma mater*. He has written medical books on these two specialties and on the *Practice of Medicine* (1830).

DEWEY, CHESTER, an American author and educator; born in Sheffield, Massachusetts, Oct. 25, 1784; died in Rochester, New York, Dec. 15, 1867. He was graduated at Williams College, and entered the ministry in 1808. He was influenced to abandon this profession by the offer of a tutorship in Williams the same year. Two years later he was offered the chair of mathematics and natural philosophy, which posi-

tion he held for 17 years. In 1836–50 he was president of the Collegiate Institute in Rochester, N. Y.; in 1850 he became professor of chemistry and natural philosophy in the University of Rochester. As a botanist he was an authority on the subject of grasses. His *History of the Herbaceous Plants of Massachusetts* was published at state expense. He also wrote *The True Place of Man in Zoölogy* and *Families and Natural Orders of Plants.*

DEWEY, GEORGE, American naval officer; born at Montpelier, Vermont, Dec. 26, 1837. His father, Dr. Julius Y. Dewey, was a well-to-do country physician, and he desired his son to take up some home profession. The lad's tastes, however, were for the sea, and his wishes finally prevailed; and after taking a preparatory course in the military school at Northfield, Vt., he was, in 1854, appointed to a naval cadetship at Annapolis, where he graduated in 1858. As midshipman he was sent on a practice cruise on the *Wabash*, spending two years (1858–60) in the Mediterranean. On the breaking out of the Civil War, the future admiral was made a lieutenant, was assigned to the *Mississippi*, a 17-gun steam sloop of the old side-wheel type, under Commander Melancton Smith, and joined the Gulf squadron, of which, in 1862, Farragut was put in command. The *Mississippi* had been Captain Perry's flagship in the expedition to Japan in 1852–53. During the attack on New Orleans, April, 1862, Dewey specially distinguished himself in passing the batteries of Fort Jackson and Fort St. Philip, and in the duel with the Confederate ram *Manassas.* In the attack on Port Hudson, La., during the night of March 8–9, 1863, the *Mississippi* ran aground, and was riddled with shot from the enemy's batteries. Her commander thereupon set her on fire and abandoned her. In June, 1863, Dewey was on board a gunboat during the attack on Donaldsonville, La.; and he was on the *Agawam* during the siege of Fort Fisher, N. C., December, 1864, to January, 1865. In March, 1865, he was commissioned as lieutenant-commander, and served for two years on the *Kearsarge* and the *Colorado* on the European station. After that he was for two years attached to the Naval Academy. From 1870 to 1875 he was in charge of the *Narragansett*, his first command, and rose to the rank of commander. After this he was attached to the Lighthouse Board until 1882, when he was given command of the *Juanita*, on the Asiatic station. In 1884 he was made captain, and assigned to the *Dolphin*, one of the first vessels of the new navy; and from 1885 to 1888 he was in command of the *Pensacola*, the flagship of the European squadron. During the ensuing eight years he filled responsible positions on shore, as chief of the Bureau of Equipment and as a member (for a second time) of the Lighthouse Board. On Feb. 28, 1896, he was made commodore, and in the same year was appointed president of the Board of Inspection and Survey. In Jan., 1898, he was placed

GEORGE DEWEY.

in command of the Asiatic squadron, consisting of the *Olympia* (flagship), first-class cruiser; *Baltimore*, *Raleigh*, *Boston*, second-class cruisers; *Concord*, third-class cruiser; *Petrel*, fourth-class cruiser; *McCulloch*, revenue cutter, used as a dispatch boat; *Nanshan*, collier; and *Zafiro*, supply vessel; with a total personnel of 1,694 officers and men.

On the breaking out of the war with Spain, April 22, 1898, Commodore Dewey was at Hong Kong with his squadron; and he received prompt instructions from Washington to find and destroy the Spanish fleet stationed somewhere in the Philippines. Accordingly, on Wednesday, April 27, he sailed with his squadron from Hong Kong in search of the enemy. The result may be given in his own first brief dispatch: "Manila, May 1.—Squadron arrived at Manila at daybreak this morning. Immediately engaged the enemy, and destroyed the following Spanish vessels: *Reina Cristina*, *Castilla*, *Don Antonio de Ulloa*, *Isla de Luzon*, *Isla de Cuba*, *General Lezo*, *Marques del Duero*, *Cano*, *Velasco*, *Isla de Mindanao*, a transport and water battery at Cavité. The squadron is uninjured, and only a few men are slightly wounded." Owing to the feeble defense of the Spaniards, Commodore Dewey's victory was an unexpectedly easy one; but that circumstance does not in the slightest degree detract from its workmanlike completeness, which, when contrasted with the trifling cost to the victor, made it one of the most remarkable victories in naval annals. Commodore Dewey's dispatch was received by President McKinley on May 7, and he at once telegraphed his thanks to Commodore Dewey, and notified him that, in recognition of his "splendid achievement," he had been appointed acting rear-admiral. Two days later the President sent a message to Congress recommending that the thanks of that body be given to "Acting Rear-Admiral George Dewey for highly distinguished conduct in conflict with the enemy, and to the officers and men under his command." On the same day (May 9) Congress passed a joint resolution of thanks, to the effect indicated, and voted to Admiral Dewey a sword of honor, and to his comrades medals commemorative of the victory. It also passed a bill increasing the number of rear-admirals from six to seven, to provide for Dewey's promotion. After the destruction of the Spanish fleet, Dewey subjected Manila to a strict blockade, and with his squadron took part in the capture of the city by General Merritt on Aug. 13, 1898. On March 2, 1899, he was created full admiral. (See also MANILA, in these Supplements.)

Admiral Dewey is a strict disciplinarian, and his action with the Spanish squadron showed that he is an admirable tactician, and a cool, clear-headed, skilful, and brave commander. He is an all-round athlete, a daring horseman and huntsman, and socially a good club man and a general favorite. At Portsmouth, N. H., in 1867, he married Miss Susy Goodwin, a daughter of Ichabod Goodwin, the "fighting governor" of New Hampshire. She died in 1872, leaving a son, George Goodwin Dewey, who, after graduating at Princeton, went into business in New York city.

DEWEY, MELVIL, an American writer and librarian; born in Adams Center, N. Y., Sept. 10, 1851; graduated at Amherst College in 1874, and during the latter portion of his student-life there, and for two years after graduation, was librarian. He then went to Boston, where he helped to organize the American Library Association and its branch, the Library Bureau. He founded and for five years (1876–81) edited the *Library Journal;* also founded the Spelling Reform Association, and the society for introducing the metric system of weights and measures. President of the American Library Association, and for 15 years its secretary, and secretary of the spelling reform and metric system societies, he devised a decimal system of classification of books, which is used generally throughout the United States. In 1883 he became chief librarian of Columbia College; in 1884 director of the Columbia College School of Library Economy; secretary and treasurer of the University of the State of New York; and in 1889 director of the New York State Library at Albany. He retained his connection with the Columbia College Library School, and organized that school at Albany, where it now is in active operation. He published a revision of the educational laws of New York (1892), a work of inestimable value; *Decimal Classification and Relative Index* (1885); and *Library School Rules.*

DEWEY, ORVILLE, an American Unitarian minister; born in Sheffield, Mass., March 28, 1794; died there, March 21, 1882. He graduated from Williams College in 1814, and from the Andover Theological Seminary in 1819. He became a Unitarian, and for two years was the assistant of Dr. Channing in Boston. He was successively pastor at New Bedford, in New York city at the Church of the Messiah, in Albany, in Washington. In 1858–62 he was at Boston at the church of the "New South Society." In 1862 he retired to his farm, where his last years were spent, visiting Europe twice on account of his health. He delivered two courses of lectures, on *The Problem of Human Life and Destiny* and *Education of the Human Race,* and wrote polemical sermons and addresses.

DE WINDT, HARRY, English traveler and writer; born in Paris, April, 1856. In 1876–78 he was aide-de-camp to his brother-in-law, Raja Brooke of Sarawak, Borneo; in 1887 he traveled from Pekin to France by land; in 1889 he rode from Russia, through Persia, to India; in 1890 he inspected the prisons of western Siberia; in 1894 he visited the mines and political prisons of eastern Siberia; in 1895, while attempting to travel overland from New York to Paris he nearly lost his life in Bering Strait, but was rescued by a whaler; in 1897 he explored the gold districts of the Klondike and Alaska. He has written *On the Equator* (1882): *From Pekin to Paris by Land* (1887): *A Ride to India* (1890); *Siberia as It Is* (1892); *The New Siberia* (1895); *A Queer Honeymoon* (a novel); and *Through the Gold Fields of Alaska to Bering Straits* (1898).

DEWING, THOMAS WILMER, an American figure and portrait painter; born in Boston, Mass., May 4, 1852. In 1876–79 he studied in Paris under Jules J. Lefebre and Boulanger. In 1880 he became a member of the Society of American Artists; in 1887 associate member of the National Academy; and in 1888 academician. In 1889 he obtained a second-class medal at the Paris Exposition. His studio is in New York. His chief paintings are *Young Sorcerer* (1877); *A Musician* (1878); *The South Wind* (1878); *Morning* (1879); *The Prelude* (1883); *A Garden* (1884); *The Days* (1884–86), which won the Clarke prize in 1887; and *Tobias and the Angel* (1887); also a ceiling with three female figures, in the Imperial Hotel, New York, and other decorations. He has also painted portraits of Mrs. Lloyd Brice, Mrs. Robert Goelet, and Mrs. Delancey Kane. His coloring is refined and delicate, and his portraits are marked by elegance of style and arrangement. His wife, MARIA RICHARDS (OAKEY), also a painter, was born in New York city, Oct. 27, 1855, and studied at the National Academy; also under John Lafarge, and in 1876 under Thomas Couture. Her works include figure and flower pieces, such as *Violets* (1878); *Mother and Child* (1880); also portraits of *A Boy* (1875); her father (1877); and a *Sleeping Child* (1878).

DE WINT, PETER, English water-color landscape painter; born of Dutch descent, at Stone, Staffordshire, Jan. 21, 1784. In 1802 he began his training as a mezzotint engraver under John Raphael Smith, the engraver and crayon painter, but he soon took to painting, and in 1807 he entered the Academy schools and exhibited three landscapes. In 1810 he became an associate exhibitor at the Water-Color Society, at whose exhibitions during the next forty years his pictures were among the most attractive features. He was a fine colorist, and his style was broad and individual. He never used body color, and seldom signed his pictures. He also, though rarely, painted in oil. Among his most famous paintings are *The Cricketers; Lincoln Cathedral; Hay Harvest; Nottingham; Richmond Hill; Cows in Water;* and several views of *Lowther Castle.* His *Cornfield* and *A Woody Landscape,* both in oil, are in the South Kensington Museum, where also, as well as in the British Museum and the National Gallery, are many of his water-colors. Died in London, June 30, 1849. See *Memoir,* by Armstrong (1888), and Redgrave's *David Cox and Peter de Wint* (1891).

DE WITT, a post village, capital of Arkansas Co., Ark., on the Arkansas river, 70 miles S.E. of Little Rock; has 3 churches, 3 newspaper offices, and 2 mills. Population 1890, 246; 1896, about 500.

DE WITT, a post village in De Witt Co., Ill., 9 miles E. by N. of Clinton; has 2 churches, a newspaper office, and a saw-mill. Population 1890, 265.

DE WITT, a post village of Clinton Co., Iowa, at a railway junction, 20 miles N. of Davenport; has 6 churches, a convent, a Catholic academy, a public park, a system of waterworks, 2 banks, 2 newspaper offices, and manufactures flour, carriages, and farming implements. Pop., 1890, 1,359; 1895, 1,344.

DE WITT, a post village of Clinton Co., Mich., on Lookingglass river, 8 miles N. of Lansing; has 2 churches, a high school, a plough factory, a foundry, a grist-mill, and 2 steam saw-mills. Pop., about 400.

DE WITT, a post village of Carroll Co., Mo., on the Missouri river, 83 miles E.N.E. of Kansas

City; has 5 churches, a newspaper office, a bank, and several factories; has large sandstone quarries in the neighborhood, and ships building stone and farm produce. Population 1890, 633.

DE WITT, a post village of Saline Co., Neb., on the Big Blue River, 13 miles N.W. of Beatrice; has 5 churches, banks, 2 newspaper offices, 2 grain elevators, and 2 grist-mills. Population 1890, 751.

DE WITT, JOHN, a clergyman of the Dutch Reformed Church, and Biblical scholar; born at Albany, N. Y., Nov. 29, 1821. In 1838 he graduated at Rutgers College, New Brunswick, N. J., and in 1842 at the New Brunswick Theological Seminary; was pastor in 1842–44 at Ridgeway, Mich.; in 1844–49 at Ghent, N. Y.; in 1849–50 at Canajoharie, N. Y.; and in 1850–63 at Millstone, N. J. In 1863 he became professor of Oriental literature in the New Brunswick Seminary, and in 1884 professor of Hellenistic Greek and New Testament Exegesis. He retired in 1892. He was one of the American revisers of the Old Testament. He published *The Sure Foundation, and How to Build on It* (1848, 2d ed., 1860), and *The Psalms, a New Translation* (1891).

DE WITT, JOHN, a Presbyterian clergyman; born in Harrisburg, Pa., Oct. 10, 1842; graduated at Princeton in 1861. He was pastor, in 1865–69, at Irvington, N. Y.; in 1869–76 of the Central Presbyterian church, Boston, Mass.; and in 1876–82 of the Tenth Presbyterian church, Philadelphia. In 1882–88 he was professor of ecclesiastical history in Lane Seminary, Cincinnati, and in 1888–92 of apologetics and missions in McCormick Theological Seminary, Chicago; and since 1892 he has been professor of church history in the Princeton Seminary. He has published *Sermons on the Christian Life* (1885).

DE WITT, SIMEON, surveyor; born in Ulster Co., N. Y., Dec. 25, 1756; died in Ithaca, N. Y., Dec. 3, 1834. In 1776 he graduated at Queen's (now Rutgers) College. Later he joined General Gates's army, and was present at Burgoyne's surrender (Oct. 17, 1777). In 1777–80 he was assistant topographer to the Continental army, and in 1780–83 chief of Washington's topographical staff. For fifty years, from 1784 till his death, he was surveyor-general of New York state. In 1798 he became regent of the state university; in 1817 vice-chancellor; and in 1829 chancellor. He published a map of New York (1804); also *Elements of Perspective* (1813). His wife, SUSAN LINN (1778–1824), wrote *Justinea* (a novel) and *The Pleasures of Religion* (a poem).

DEW-POINT. See HYGROMETRY, Vol. XII, 570.

DEXILEUS, a young Athenian soldier, who was killed before Corinth, 394 B.C. His monument, a stele, or slab, bearing a beautiful sculpture in relief of a youthful horseman riding down an enemy, is on the Sacred Way, or Street of Tombs, in Athens.

DEXIPPUS, a Greek philosopher, pupil of Iamblichus. About A. D. 350 he wrote, in dialogue form, a commentary on the *Categories* of Aristotle, which is extant in a Latin translation, printed in Paris in 1549, and edited by Spengel (Munich, 1859). He also wrote commentaries, which are no longer extant, on Plato and Aristotle, defending the latter against the criticisms of Plotinus.

DEXIPPUS, PUBLIUS HERENNIUS, a Greek historian and general. At the time of the invasion of Greece by the Goths in A. D. 262, he was one of the highest officers of Athens. He took command of the Greek forces, and succeeded in driving the Goths out of the country. He afterward wrote an account of this war; also two histories, one of Macedonia from the time of Alexander, and the other a general history from the mythical ages to Claudius Gothicus, A. D. 268. His countrymen erected a statue in his honor.

DEXTER, in Heraldry, is the side of a shield or armorial figure which is to the right of the bearer and to the left of the spectator.

DEXTER, an incorporated post town in Dallas Co., Iowa, 36 miles W.S.W. of Des Moines; has 4 churches, a graded school, a bank, and a newspaper office. Population 1890, 607; 1895, 740.

DEXTER, a post city in Cowley Co., Kansas, on Grouse Creek; has 3 churches, a high school, and a bank. Population 1890, 371; 1895, 299.

DEXTER, a post village in Penobscot Co., Maine, on a small lake, 40 miles W.N.W. of Bangor; has 7 churches, 2 banks, a newspaper office, 5 woolen-mills, 2 foundries and machine shops, and several factories. Population 1890, 1,910.

DEXTER, a post village in Washtenaw Co., Mich., on the Huron river, 9 miles N. W. of Ann Arbor; has 4 churches, a union school, a bank, a newspaper office, 2 flour-mills, a woolen-mill, and a sash and blind factory. Pop. 1880, 1,008; 1890, 879.

DEXTER, a post village in Stoddard Co., Mo., at a railway junction, 49 miles W.S.W. of Cairo, Ill.; has 4 churches, a public school, a bank, 2 newspaper offices, a flour- and a saw-mill. Pop. 1890, 792.

DEXTER, a post village in Jefferson Co., N. Y., on Lake Ontario, at the mouth of the Black River, 7 miles W.N.W. of Watertown; has 4 churches, 4 pulp-mills, 2 paper-mills, 3 wood factories, and a sulphite factory. Population 1890, 737.

DEXTER, EBENEZER KNIGHT, merchant and philanthropist; born at Providence, R.I., April 26, 1773; died there, Aug. 10, 1824. For ten years, including the trying period of the war of 1812, he ably and honestly filled the office of United States marshal for Rhode Island district. He accumulated a fortune in business, and on his death bequeathed to his native city, for the benefit of the poor, the bulk of his property, then valued at $60,000, as a permanent fund, besides forty acres of land on Providence Neck, on which Dexter Asylum, completed in 1830, still stands. He also devised, for use as a training-ground, a large field, on which, in 1894, was erected a statue of the donor, the gift of Henry C. Clark.

DEXTER, HENRY, an American sculptor; born in Nelson, N.Y., Oct. 11, 1806; died in Cambridge, Mass., June 23, 1876. In early life he worked on a farm, then at blacksmithing until after he was married. He determined to become an artist, and took up portrait-painting, but in 1840 turned to sculpture. He became particularly successful in making portrait busts. His first was that of Samuel Eliot, mayor of Boston. In 1860 he modeled 31 busts of the governors in the United States then holding office, being all save those of Oregon and California. Agassiz, Charles Dickens, Longfellow, and other fa-

mous men were among those whose portrait busts were made by him. He executed pieces of statuary. *The Backwoodsman* (1847); *The Cushing Children* (1848); *General Joseph Warren at Bunker Hill* (1857); and *Nymph of the Ocean* (1870), are some of his works.

DEXTER, HENRY MARTYN, an American clergyman and author; born in Plympton, Massachusetts, Aug. 13, 1821; died in New Bedford, Massachusetts, Nov. 13, 1890. He was graduated at Yale and at the Andover Theological Seminary, and became, in 1844, the pastor of a Congregational church at Manchester, New Hampshire. Five years later he was given the care of the Berkeley Street Church in Boston. He became connected with the *Congregationalist* in 1851, and for 15 years edited the paper. For seven years he edited the *Congregational Quarterly*, and in 1867 he resigned his pastorate, being called to the office of editor-in-chief of the consolidated *Congregationalist and Recorder*. For three years (1877–80) he was lecturer on Congregationalism at the theological seminary where he graduated. Dr. Dexter wrote a work on *Congregationalism* (1865), and also *The Voice of the Bible the Verdict of Reason* (1858); *The Congregationalism of the Last 300 Years* (1880); besides works on future probation, on woman suffrage and on historical matters connected with the early Puritan church in New England, such as *A History of Old Plymouth Colony*, etc.

DEXTER, SAMUEL, an American jurist; born in Boston, Massachusetts, May 14, 1761; died in Athens, New York, May 3, 1816. He was graduated at Harvard, studied law, practiced in Worcester and Middlesex counties, and was elected to the Massachusetts legislature in 1788, and to both houses of Congress. He resigned from the Senate in 1800, having been appointed Secretary of War by President Adams, and resumed his legal practice at the conclusion of his public services in the Cabinet. He was an earnest advocate of temperance, becoming first president of the first temperance society in his state. He was a man of independent thought and action, and to this independence is due his refusal of many tempting offers of political preferment. He published a poem, *Progress of Science* (1780), and a pamphlet, *Letter on Freemasonry*. He wrote the Senate's reply to President Adams's Washington Memorial.

DEY. See ALGERIA, Vol. I, p. 566.

DEZFUL OR DIZFUL, a city of the province of Khuzistan, Persia, on the Dizful River. It is the principal mart of the province. Population, 16,000. See KHUZISTAN, Vol. XIV, p. 68.

DHALAK ARCHIPELAGO. See DAHLAK, in these Supplements.

DHAWALAGHIRI, once supposed to be the highest peak of the Himalaya Mountains, but now ascertained to be only the fourth in point of altitude, Mt. Everest (29,009 feet), Kinchinjunga (28,156 feet), and Mt. Shumalar (27,200 feet), all being higher. Its height is 26,820 feet. It is within the limits of Nepaul.

DHOLE. See INDIA, Vol. XII, p. 741.

DHULEEP SINGH, MAHARAJAH, the last of the great Punjab princes; born in 1838; died in Paris, Oct. 23, 1893. He was a son of the famous Dhuleep Singh, who was the most powerful native prince in India. He succeeded to his father's power in 1843. The army, the mainstay of his government, was not kept in perfect organization, and was easily defeated by the British in 1848. Great Britain annexed the Punjab in 1849, deposed Dhuleep Singh, and took from the Indian government, as pay for losses claimed, many of his estates and properties, including the salt-mines and the celebrated Koh-i-noor diamond. He went to England, was naturalized and professed Christianity. He was pensioned by the British government and allowed to retain part of his Indian estates. He spent all his property, and in 1885 quarreled with the British government, claimed he had been robbed of the Koh-i-noor, and started to return to India. He was detained by the government at Aden, and finally went to Russia, where he was pensioned by the czar. He then repudiated Christianity and engaged in secret hostility against England. He later expressed regret for these actions and made peace with the British government. See PUNJAB, Vol. XX, p. 112.

DHUNCHEE OR DHANCHI, an Asiatic plant (*Sesbania aculeata*) of the family *Leguminosæ*, having an elongated many-seeded pod, alternately swollen and contracted, as if it contained a string of beads. The Dhunchee is cultivated in India for its fibers.

DHYANI-BUDDHAS. See BUDDHISM, Vol. IV, p. 438.

DIABASE. See GEOLOGY, Vol. X, p. 235.

DIAGEOTROPISM, a term in physiological botany applied to the phenomenon of an organ placing itself in a horizontal position under the influence of gravity; that is, at right angles to the directive force of gravity. Such organs are usually dorsiventral, the two surfaces differing from each other. Many leaves, rootstocks, runners, etc., are *diageotropic*.

DIAGNOSIS (Gr., *dia*, through; *gnosis*, knowledge), in general, a scientific determination or discrimination, used in botany for the determination of plants for classification; in medicine, for the determination of diseases by their symptoms. This discrimination of a disease embraces its points of distinction from other diseases, its symptoms, their relation to one another, and to the state of the different organs and functions of the body, in so far as this can be appreciated during life. Diagnosis is usually spoken of in contrast with prognosis, which implies the judgment framed by the physician as to the issues of the disease, and also with prophylaxis, which refers to the warding off of disease when supposed to be impending.

DIAGOMETER, an electroscope, the invention of M. Rousseau, to measure the amount of electricity transmitted by different bodies to determine their conductivity. It is sometimes used for determining the conducting power of fixed oils and for detecting their adulteration. It consists of a dry pile, or voltaic pile, whose current, made to pass through the body, determines its conductivity by the degree of deflection of a magnetized needle.

DIAGONAL, in plane geometry, a straight line

joining any two angles, not adjacent, of a rectilineal figure. A line drawn between two adjacent angles would coincide with the boundary line. A triangle has no diagonal, because any two of its angles are adjacent; a four-sided figure has two diagonals; a five-sided, five; a six-sided, nine; etc. The number of possible diagonals in any figure is found by taking three from the number of sides, multiplying the remainder by the number of sides, and taking half of the product.

DIAGONAL SCALE, a device for measuring fractions of units. As it is geometrically true that the inclosing sides of equal angles in equiangular triangles are proportional, a scale is made on which one set of equidistant parallel lines is crossed by another set of parallel lines at the same distance apart, and at an oblique angle to the first set. If the distance on any of the first set of lines between two successive oblique lines represents the unit, the distances on the first set between any oblique line and a line from its foot perpendicular to the first set represent the successive fractions of the unit, the smallest being measured on the first horizontal line above the foot of the oblique line, etc.; thus, seven feet six inches would be measured on the sixth horizontal line between the perpendicular and the eighth oblique line from it.

DIAHELIOTROPISM, a term in physiological botany applied to the phenomenon of an organ placing itself at right angles to the incident rays under the influence of light. Many foliage leaves are *diahelitropic*.

DIALECT. See PHILOLOGY, Vol. XVIII, pp. 776, 777.

DIALECTICS. See LOGIC, Vol. XIV, pp. 786, 787.

DIALOGUE, a discourse between two or more persons, implying more formality and greater unity of subject than a mere conversation. As a literary form, it was oftenest used by the ancients, especially by the Greek philosophers in conveying their instructions. (See LUCIAN, Vol. XV, p. 42.) The Socratic dialogue is a conversation in form of question and answer, in which the person questioned is himself led to propound those ideas which the questioner desires to present to him. The dialogues of Plato might be called philosophical dramas in which the Socratic method of investigation is brought to bear on the speculative subjects discussed. Cicero also used the dialogue frequently. Among modern writers, Fénélon, Machiavelli, Lessing and Berkeley have employed this form. Landor's *Imaginary Conversations* is a happy effort of the kind. However, the state of modern science makes it impracticable to put the dialogue to its ancient use. The drama is dialogue combined with action.

DIALYSIS. See DIFFUSION, Vol. VII, p. 217; and CHEMISTRY, in these Supplements.

DIAMAGNETIC POLARITY. See MAGNETISM, Vol. XV, pp. 266, 267.

DIAMAGNETIC SUBSTANCES. See ELECTRICITY, § 60, in these Supplements.

DIAMAGNETISM. See MAGNETISM, Vol. XV, p. 262.

DIAMOND BEETLE. See COLEOPTERA, Vol. VI, p. 133.

DIAMOND, CAPE, the point on which the citadel of Quebec stands, formed by the confluence of the St. Charles and St. Lawrence rivers. It rises 333 feet above the water.

DIAMOND–CUTTING INDUSTRIES IN THE UNITED STATES. For general article on the diamond industry, and optical properties of diamonds, see DIAMOND, Vol. VII, pp. 162–167. Only a very limited number of diamonds have been found in the United States. They are met with in well-defined districts of North Carolina, Georgia, Wisconsin and California, and all the discoveries thus far have been accidental.

The returns of the census in 1890 showed that there were, in New York, sixteen firms engaged in cutting and recutting diamonds, and in Massachusetts, three. Cutting had also been carried on, at times, in Pennsylvania and Illinois, but was discontinued. In 1889 seven of the New York firms ran on full time, but the others were unemployed part of the time, owing to inability to obtain rough material at a price at which it could be advantageously cut. The firms that were fully employed were generally the larger ones, whose business consisted chiefly in repairing chipped or imperfectly cut stones, or in recutting stones previously cut abroad, which, owing to the superior workmanship at command here, could be recut at a profit, or in recutting very valuable diamonds when it was desired, with the certainty that the work could be done under their own supervision, thus guarding against any possible loss by exchange for inferior stones. The persons employed numbered 236, earning, on an average, $3.55 per day when at work.

The importation of rough and uncut diamonds in 1880 amounted to $129,207, in 1889 to $250,187, and the total for the decade was $3,133,529, while in 1883 there were imported $443,996 worth, showing that there was 94 per cent more cutting done in 1889 than in 1880, but markedly more in 1882 and 1883. This large increase of importation is due to the fact that in the years 1882 to 1885 a number of our jewelers opened diamond-cutting establishments, but the cutting has not been profitably carried on in this country on a scale large enough to justify branch houses in London, the great market for rough diamonds, where advantage can be taken of every fluctuation in the market, and large parcels purchased, which can be cut immediately and converted into cash; for nothing is bought and sold on a closer margin than rough diamonds.

DIAMOND–FIELDS OF SOUTH AFRICA. See CAPE COLONY, Vol. V, p. 42; also KIMBERLEY, *post*, pp. 1789–90.

DIAMOND NECKLACE, INTRIGUE OF THE. See ROHAN, Vol. XX, pp. 622, 623.

DIAMONDS, ARTIFICIAL. See CHEMISTRY, in these Supplements.

DIANA MONKEY (*Cercopithecus diana*), an African monkey with a white crescent mark on the forehead, which bears some fancied resemblance to the silver crescent of the goddess Diana.

DIANA, TEMPLE OF. See EPHESUS, Vol. VIII.

DIANE DE POITIERS, mistress of Henry II of France; born Sept. 3, 1499; died April 22, 1566. She

was the wife of Louis de Brézé, the seneschal of Normandy, and upon his death, when she was forty years old, became the mistress of the French dauphin. When he came to the throne as Henry II, he made her Duchess of Valentinois, and allowed her to influence him during his entire reign. See HENRY II, Vol. XI, p. 670.

DIAPASON REGULATOR. The French, who give the name of *diapason* to the tuning-fork, have lately made attempts to use that instrument in connection with clockwork, partly as a means of counting very small intervals of time. M. Duhamel made an arrangement in which a cylinder, by means of a screw-tapped end, was made to advance a little in the direction of the axis; this cylinder was covered with blackened paper and was rotated by means of clockwork. A diapason had a style, or marker, made of a small bit of pointed spring, fixed to the end of one of the prongs. On the diapason being sounded in the usual way, and the spring placed lightly against the cylinder, the style traced a sinuous white line on the black paper. The sinuosities became representatives of minute intervals of time. The diapason regulates the rate of motion of the train of wheels by the equilibrity of the vibration of the prongs, while the train of wheels tends to increase the time during which the prongs vibrate and sound. An index carried by an arbor round a dial may be made to recount or record the vibrations. Brequet's experiments have gone as far as instruments giving two hundred simple vibrations (one hundred double vibrations) per second.

DIAPENSIACEÆ, a small family of mostly arctic or alpine plants, of doubtful affinity, although usually regarded as related to the *Ericaceæ*. They are low, tufted and heath-like, are common to the arctic regions of both hemispheres, and have been apparently stranded on mountain tops, or in other sheltered places, south of the arctics. In North America, *Diapensia* extends from the arctics to the northern mountain peaks of the United States; *Pyxidanthera* occurs in the pine-barrens of New Jersey; while *Shortia* and *Galax* belong to the Alleghanies of the United States, as well as to the mountains of Eastern Asia.

DIAPHRAGM. See MAMMALIA, Vol. XV, p. 365; and RESPIRATION, Vol. XX, p. 476.

DIASTASE. See BREWING, Vol. IV, p. 267.

DIAS VIEIRA, JOÃO PEDRO, a Brazilian statesman; born in Guimarães, March 30, 1820; died Oct. 30, 1870. He was a lawyer, an orator, a member of the provincial assembly of Maranhão; held the offices of Attorney-General of the Treasury, was governor of the province of the Amazonas, deputy to the Chamber of Representatives, Minister of the Navy and of Foreign Affairs.

DIATHERMANCY. See ATMOSPHERE, Vol. III, p. 33.

DIATHESIS, a Greek word signifying a disposition or arrangement, and applied by the old medical authors to the predisposition or constitution of the body which renders it prone to certain diseased states. By modern writers on medicine it is used almost synonymously with temperaments.

DIATONIC SCALE. See MUSIC, Vol. XVII, p. 91.

DIAZ OR DIAS, BARTHOLOMEU, a Portuguese navigator; born in 1445. He was a gentleman of the royal household of John II, where he came in contact with many of the scientific men of the time. In 1486 the king gave him the command of an expedition to explore the western coast of Africa. He soon passed the limit of South Atlantic navigation, taking possession of the country in the name of the king of Portugal, and finally sailed or was blown around the southern extremity of the continent without being aware of it. Returning homeward, he discovered the cape which he called the "Cape of All the Storms," and which was later changed by the king to its present name, the Cape of Good Hope. In December, 1487, he arrived at Lisbon, and at first was received with enthusiasm, but Vasco da Gama was given the preference, under whom Diaz was obliged to serve in the expedition of 1497. Three years later he joined the expedition of Cabral, the discoverer of Brazil, and was drowned in a shipwreck, May 29, 1500.

DIAZ, PORFIRIO, a Mexican statesman and general; born at Oaxaca, Sept. 15, 1830. He began the study of law, but left it to go into the army during the war with the United States. From this time until 1876 he was continually engaged in revolutionary attempts against the many and various governments which tried to rule the country. During this period he showed great abilities as a political and military leader. As general of the republican forces, he was especially active against Maximilian and his supporters. Twice he was forced to surrender, but escaped each time to carry on the war. Upon the re-establishment of the republic, Juarez was elected President. When he died, Lerdo succeeded him. Diaz started a revolution, drove Lerdo from power, and got himself proclaimed President by Congress, serving from May 5, 1877, to Nov. 30, 1880. During his term the tariff was revised, the financial condition of the country improved, and important railroad lines established. He was succeeded by his Secretary of State, Manuel Gonzalez, who owed his election to Diaz's influence. Four years later, Diaz was elected again, and when his term expired in 1892, he was re-elected, the constitution being changed, at his dictation, to permit this. In 1896 he was chosen for the office for the fifth time. Although Diaz has been severely criticised by some for assuming dictatorial powers, Mexico needed a strong ruler to govern her, and he has done much toward giving the government stability and credit, and the people prosperity.

PORFIRIO DIAZ.

DIAZ DEL CASTILLO, BERNAL, a Spanish soldier, and historian of the conquest of Mexico; born at Medina del Campo Valladolid about 1498. He was a common soldier with Pedrarias at Darien in 1514, and soon after went to Cuba. Later he was with Cordoba when Yucatan was discovered, and with

Grijalva during his explorations of the Mexican coast in 1518. In the following year he enlisted under Cortés, and served in subordinate positions during the campaigns which led to the conquest of the Aztec empire. In 1568 he began to write *Corónica de la Conquista de Nueva España*, a simple, rough soldier's narrative of the events in which he had taken part. The book was first published in 1632 at Madrid, some time after its author's death. There are later editions, the best being that in the *Biblioteca de Autores Españoles*, vol. 25. Diaz died in Nicaragua in 1593.

DIAZ DE SOLÍS, Juan, a Spanish navigator; born at Lebrija, Asturias, in 1470; died in 1516. Little is known of his earlier voyages, but it is probable that he was with Gonçalo Coelho in his explorations of the Brazilian coast in 1503. Three years after, he accompanied Pinzon in an exploration of the coasts of Central America, and in 1508, again with Pinzon, he coasted along South America and entered the bay of Rio Janeiro. In 1512, after the death of Vespucci, he was appointed chief pilot of Spain, and sent upon an expedition to seek a southwestern passage to the Indies. He entered the Plata River, but, landing on an island, was killed by the Charruas Indians. The Plata was for some time called Rio de Solís, though it is probable that he was not its first discoverer.

DIBBLE, Sheldon, an American missionary to Hawaii; born in 1809; died in 1845. He studied theology and was ordained in 1830, sailing for the Hawaiian islands the same year. He visited the United States in 1837, but returned in 1839 to end his days in missionary labors. He wrote valuable works on historical and other subjects.

DIBRANCHIATA. See Mollusca, Vol. XVI, p. 669.

DICÆUM, a genus of birds closely related to the sun-birds (*Nectariniidæ*), living principally in India and Australia. They are very beautiful birds and sweet singers.

DICE (plural of die), small cubes of bone or ivory marked on each side with black dots, from one up to six in number, the dots being arranged so that the sum of all on two opposite faces of the die is seven. They are employed in certain games of chance, such as backgammon; also in settling some dispute in which the decision is referred to the highest number thrown. The throwing of dice is effected by means of a small tubular box, which, held in the hand, is shaken at will by the player. When the dice are true cubes, there is no plan by which any kind of shaking can bring out a desired number. The invention of dice is very ancient, being attributed both to the Greeks and the Egyptians. The game was very popular among the later Romans, and is frequently mentioned in the literature of the time. Two cubes, supposed to be Etruscan dice, which were marked with words instead of dots, have furnished evidence of Taylor's theory that the Etruscan language was of Turanian origin, the words being supposed to stand for numerals.

DICENTRA, a genus of herbs of the family *Fumariaceæ*, characterized by its corolla being heart-shaped, or two-spurred at base, and its crested seeds. *D. spectabilis*, of eastern Asia is the common cultivated "bleeding heart," with showy pink-red flowers. The common wild species of the United States, with white flowers and delicate compound leaves, are *D. Cucullaria*, or "Dutchman's breeches," with two squared corolla, and *D. Canadensis*, or "squirrel-corn," with heart-shaped corolla. The genus has also been called *Diclytra* and *Dielytra*.

DICEY, Albert Venn, an English author; born in 1835; Vinerian professor of law at Oxford University from 1882; a frequent contributor to periodical literature, and a brilliant writer; but known from a remarkable exposition of the law of the British constitution, accorded the highest praise by competent critics. His style is clear, his argument cogent and dispassionate, and his contribution to the literature of his time must be reckoned as important in its bearing upon political questions of moment.

DICEY, Edward, an English author; born in Leicestershire in 1832, and educated at Cambridge. He served for a time as reporter and special correspondent for the *Daily Telegraph*, and for three months was editor of the London *Daily News*. In 1870 he accepted the editorship of the *Observer*, a position which he held until 1889. He is the author of *A Memoir of Cavour; Rome in 1860; The Schleswig-Holstein War* (1864); and other works of like character. He was an authority on Egypt, and a strong advocate of a British annexation of that country. He was made a C.B. in 1885. He took much interest in South African affairs, and paid a long visit to the Transvaal.

DICHLAMDEOUS. See Botany, Vol. IV, p. 126.

DICHOGAMY, a term expressing the fact that stigmas and stamens of the same flower become functional at different times, thus preventing close-pollination and necessitating cross-pollination. In cases of dichogamy the flowers are either *protandrous*, in which case the stamens mature and shed their pollen before the stigma is receptive; or *protogynous*, in which case the stigma matures and is receptive before the stamens have fully developed. In these cases it is necessary for pollen to be exchanged between flowers in different stages of development. Examples of protandrous flowers are found among *Umbelliferæ*, *Compositæ*, *Campanulaceæ*, etc.; of protogynous flowers, among species of *Aristolochia*, *Arum*, *Plantago*, in *Scrophularia nodosa*, etc.

DICHOTOMY, Law of. See Psychology, Vol. XX, p. 79.

DICHROISM. See Mineralogy, Vol. XVI, p. 375.

DICHROITE. See Mineralogy, Vol. XVI, p. 418.

DICKENS, Charles, an English editor and publisher, son of Charles Dickens, the English novelist, was born in 1837. He was carefully educated, and it being thought that his talents lay more in business than in literature, he was given excellent opportunities for developing his tastes in that direction. He was a protégé of Miss Coutts, afterward Baroness Burdett-Coutts, under whose auspices he was sent to China, and who afterward found an

opening for him in London. He became interested in an extensive printing establishment having its headquarters at the Crystal Palace, connection with which he retained after his father's death. His father, without endeavoring to influence his inclinations toward literature, constantly sought to train him in the business management of *All the Year Round*, the journal which he had himself founded, and which he made such a success. The son became proprietor of this popular journal, which suspended publication in 1895. As a public reader of his father's well-known works, and especially in the characterization of the leading parts, he was almost as great a success as was the father. He possessed all the copious notes of the father's "business," and by constant study, and under the latter's careful inspection, he was exceptionally well equipped. He had also the natural gift of oratory and an easy flow of speech. He published a number of handbooks of an informing character—*Dictionaries of London, Paris, The Thames, The University of Cambridge*, and *The University of Oxford*, the series having been commenced in 1879. He edited the *Life of Charles Mathews*, which was chiefly autobiographical (1879). He died at Kensington, July 20, 1896.

DICKERSON, Mahlon, an American statesman; born at Hanover, New Jersey, April 17, 1770; graduated at Princeton in 1789, and was admitted to the practice of law in 1793, and settled in Philadelphia. He held various political offices in Pennsylvania, and then removed to New Jersey, where he became judge of the supreme court and chancellor. In 1811 he became a member of the legislature, and four years later was elected governor of the state. From 1817 to 1833 he was a member of the United States Senate, and from 1834 to 1838 was Secretary of the Navy. Subsequently he was on the bench of the United States district court of New Jersey, and in 1846–48 was president of the American Institute. He published *Speeches in Congress*. He died at Succasunna, New Jersey, Oct. 5, 1853.

DICKINS, John, an American divine; born in London, England, Aug. 24, 1747; died in Philadelphia, Sept. 27, 1798. He was one of the leading American Methodist preachers of his day. He aided in founding Cokesbury College, near Abingdon, Maryland, the first academic institution of the Methodist denomination in the United States, and the Methodist Episcopal Book Concern. He published the *Methodist Magazine* from 1797 until his death.

DICKINSON, Anna Elizabeth, an American orator and authoress; born of Quaker parents in Philadelphia, Oct. 28, 1842. She made her first public speech in 1857, and from that time continued as a speaker on temperance, slavery and politics. She taught school from 1859 to 1860, and for the year succeeding was employed in the United States mint. She appeared as an orator in many states of the Union until 1876, when she left the lecture platform for the stage. She both wrote and acted, but with no great success, and in 1888 resumed lecturing. She published several books.

DICKINSON, Daniel Stevens, an American statesman; born in Goshen, Connecticut, Sept. 11, 1800; died April 12, 1866. He began the practice of law in Guilford, New York, in 1828, but in 1831 settled in Binghamton. In 1836 he was elected state senator, and in 1842 became lieutenant-governor. In 1844 he was made United States Senator, and in 1852 he declined the office of collector of the port of New York. In 1861 he was elected attorney-general of the state, and subsequently became district attorney for the southern district of New York. This position he held till his death. He was distinguished as a debater and the leader of the Hunkers, or Conservative Democrats, of New York.

DICKINSON, Don M., an American lawyer and politician; born at Port Ontario, New York, Jan. 17, 1846, of New England parents, who removed to Michigan when the boy was two years old. He was educated in the public schools of Detroit and at the University of Michigan, and was admitted to the bar in 1867. In 1872 he entered the political field as secretary of the Democratic State Central Committee of Michigan, and in the Tilden campaign he acted as chairman of that body. Subsequently he represented his state on the National Democratic Committee, and in 1886 he was appointed Postmaster-General by President Cleveland. On the expiration of his term he resumed the practice of law in Detroit.

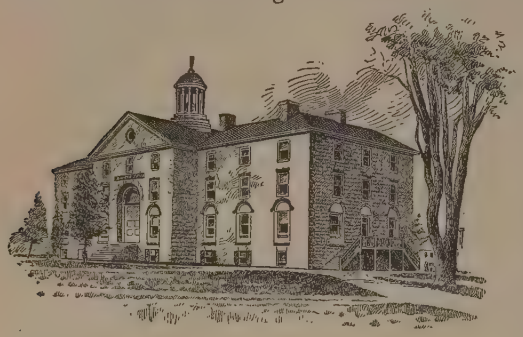
DON M. DICKINSON.

DICKINSON, John, an American statesman; born in Talbot County, Maryland, Nov. 13, 1732. He studied law in Philadelphia and London, and began practice in Philadelphia. In 1798 he published his famous *Letters to the Inhabitants of the British Colonies, by a Pennsylvania Farmer*, which sought to prove that Parliament had no right to tax the colonies. In them the phrase was first used, "No taxation without representation." In 1776 he spoke against the Declaration of Independence in Congress, arguing that the act was premature; he was one of the few members of that body who did not sign the Declaration. When the war broke out he enlisted as a private, but was soon raised to a brigadier-general. In 1779 he was elected to Congress from Delaware, in the following year to the Delaware assembly, and in 1781 became president of the state. From 1782 to 1785 he was president of Pennsylvania. Dickinson College was founded and endowed by him in 1783. He wrote numerous political essays, which have a high reputation for learning.

DICKINSON, Jonathan, an American Presbyterian clergyman; born at Hatfield, Massachusetts, April 22, 1688; died Oct. 7, 1747. In 1709 he became pastor of the church at Elizabethtown, New Jersey, where he remained until his death. He was among the founders of the College of New Jersey, and in 1746 was chosen its first president. Among his publications are *Reasonableness of Christianity* and *The True Scripture Doctrine Concerning Some*

Important Points of Christian Faith. Dickinson Hall at Princeton College commemorates his name.

DICKINSON COLLEGE, founded at Carlisle, Pennsylvania, in 1783. It is next to the oldest educational institution in the state, and was named after John Dickinson, "President of Pennsylvania." Its first president was Charles Nisbett. It was under Presbyterian control till 1833, when the division into Old and New Schools brought such embarrassments



DICKINSON COLLEGE.

that it was transferred to the Methodist Episcopal Church. In 1866, the centennial year of American Methodism, over $100,000 was given to its endowment fund. Since 1882 the fund has been increased by about $120,000, and buildings and equipment given to the value of $125,000. The college offers three courses: classical, Latin scientific and modern language. Its library contains 30,000 volumes.

DICKSON, SAMUEL HENRY, an American physician and author; born in Charleston, South Carolina, Sept. 20, 1798; died in Philadelphia, March 31, 1872. He was graduated at Yale in 1814; as M.D. at the University of Pennsylvana in 1819; and received the degree of LL.D. from the University of New York, 1853. From 1824 to 1858, with a brief interval, he was professor of the institutes and practice of medicine in the Charleston, South Carolina, Medical College, which he helped to found. From 1847 to 1850 he held a similar chair in the University of New York, and from 1858 until his death he was professor in Jefferson Medical College, Philadelphia. Owing to his genial, social and literary accomplishments, he has been compared to Oliver Wendell Holmes, whom he also resembled in the classically elegant style of his medical writings. Among his medical works are *Studies in Pathology and Therapeutics* (1867). He also wrote occasional essays and poems, and a treatise to prove the inferiority of the negro race.

DICOTYLEDONS. See VEGETABLE KINGDOM, Vol. XXIV, p. 131.

DICTIONARY. In addition to the dictionaries named in Vol. VII, pp. 179–193, the following publications of recent years should be noted:

The Oxford English Dictionary. A new dictionary on historical principles, founded mainly on the materials collected by the Philological Society; edited by Dr. James A. H. Murray and others. The publication of this work was commenced, in sections, in 1888, and had advanced, in the issue of April, 1896, to "Field—Fish," being pp. 193–256 of Vol. IV. One of the distinctive features of this learned and valuable work is the indication, by dated quotations, of the periods when the different uses of each word began and ended in English literature.

A Dictionary of the English Language, by Rev. James Stormonth (1885). The especial design of this work is to present the correct usage of words, and the words are grouped according to their derivation.

An Etymological Dictionary of the English Language, arranged on a historical basis, by W. W. Skeat, Oxford (1882). This was the best English etymological dictionary issued up to that time.

The Century Dictionary, an encyclopædic lexicon of the English language, edited by Professor William Dwight Whitney of Yale (6 vols., 1891), to which is added a seventh volume, entitled *The Century Cyclopædia of Names.* In 1895 the work was reissued in ten volumes. It contains over 215,000 words and 50,000 phrases, and makes the attempt to give idiomatical phrases and the colloquial as well as the dialectal use of words. Technical words and terms are not only defined with scientific accuracy, but the objects they designate are described and illustrated, after the manner of an encyclopædia, with diagrams and pictures, of which there are 7,500. American writers are largely represented in the 300,000 literary quotations given.

A Standard Dictionary of the English Language, upon original plans (1895), contains about 320,000 words, carefully selected from many other dictionaries, and from several thousand representative authors; and while it gives place to the reform spellings put forth by the American Philological Association and by the American Spelling Reform Association, it does not adopt them. A prominent feature consists in giving the commonest meaning of each word first, while the etymology of words comes last in the order of their treatment. In giving synonyms and antonyms, care has been taken to bring out the distinctions with sharpness, and with especial reference to the correct established usage of the present time. Another feature is, that exact references are given for the quotations used to illustrate the meanings of words. The quotations themselves have been selected from modern standard English and American writers, and some of them are taken from newspapers. The pictorial illustrations have been selected with discrimination, and are drawn by specialists in that line.

The Encyclopædic Dictionary (1888) is styled a new and original work of reference to all the words in the English language, with a full account of their origin, meaning, pronunciation and use, with numerous illustrations. The plan of this work is somewhat in line with that of the *Century Dictionary*, which it preceded, but with the popular feature of being less expensive. The definitions are concise, and the cyclopædic matter easy.

Webster's International Dictionary of the English Language (1890) is a revision of the 1864 edition of Webster's Unabridged, made under the supervision of Noah Porter, LL.D., ex-president of Yale College, and contains many additions and changes,

made with the primary object of incorporating the new words and meanings which have come into use, especially in the departments of science and technology.

It remains to notice a work "which does greater honor to American scholarship than any other work ever published in the combined fields of sacred and classical learning," *A Greek Lexicon of the Roman and Byzantine Periods*, by Evangelinus Apostolides Sophocles, LL.D., of which a limited edition was printed in 1870 by the munificence of a few wealthy gentlemen, and a memorial edition edited by Prof. C. H. Thayer in 1887. Professor Sophocles was a native Greek, educated at the convent on Mount Sinai, a profound scholar who gave the best years of his life to Harvard University.

DICYNODON, a fossil reptile found in southern Africa. It is a highly generalized form, combining the characters of many reptiles.

DIDACHE OR TEACHING OF THE TWELVE APOSTLES. See APOSTLES, TEACHING OF THE TWELVE, in these Supplements.

DIDELPHIA. See MAMMALIA, Vol. XV, pp. 371, 372.

DIDIUS, SALVIUS JULIANUS. See SEVERUS, Vol. XXI, p. 699.

DIDON, HENRI, ABBÉ, a French priest and author; born at Thouvet, Isere, March 17, 1840; educated at Grenoble Seminary, and a disciple of Lacordaire; became a member of the Dominicans in 1862. Having visited Rome, he returned in 1868 and commenced preaching with great effect in Paris and other cities of France. In 1871 he delivered the funeral sermon at Nancy on Monseigneur Darboy. His first book was *Man According to Science and Faith*, and his first printed sermon, *What is a Monk?* In consequence of some startling sermons in 1879, dealing with the church and society, he was sent into temporary seclusion in the monastery of Carbara, in Corsica. A subsequent visit to Germany and the Holy Land furnished him with themes for *The Germans*, in which he pointed out that theory and practice have nothing in common in the Fatherland; and for *La Vie de Jesus* (1891), opposing the views of Renan, which had an immense circulation and was translated into English.

DIDYMIUM. See CHEMISTRY, Vol. V, pp. 542, 543.

DIDYMUS, a Greek grammarian of Alexandria, born 62 B.C.; who was the teacher of Apion and other great men of the Augustan Age. The almost numberless works ascribed to him are not preserved, and he himself, being unable to remember them all, was styled "the book-forgetter." His fecundity as an author also brought him the name of "brasen bowels." Quotations extant from his many treatises on Homeric literature and other Greek classics form the basis of some learned *scholia* upon those subjects by modern writers.

DIEFENBACH, LORENZ, a German philologist and ethnologist; born at Ostheim, Hesse, July 29, 1806; studied theology and philosophy at Giessen, and music and modern languages at Frankfort-on-the-Main. He traveled much, and devoted himself to pastoral work for twelve years. In 1848 he settled at Frankfort, and died there March 28, 1883. His literary industry was enormous, as well in the line of poetry and romance as in the heavy and learned works which have placed him among great scholars. He published, among other works, *Celtica* (1839–41); *Gedichte* (1840); *Lexicon Comparativum Linguarum Indo-Germanicarum* (1846–51); and *Glossarium Latinum Germanicum Mediæ et Infimæ Ætatis* (1857).

DIEFFENBACH, JOHANN FRIEDRICH, a German surgeon; born at Königsberg, Feb. 1, 1792; died at Berlin, Nov. 11, 1847; served as a volunteer in a Mecklenburg corps during the campaigns of liberation (1813–15); and while studying surgery at Königsberg and Bonn, supported himself by giving lessons in fencing and swimming. He followed the course of the schools of Vienna and Paris, and received the degree of doctor at Würzburg in 1822, the subject of his thesis being *Nonnulla de Regeneratione et Transplantatione.* He settled at Berlin, where his talent and manual skill as an operator gained him great distinction, and in 1840 he was surgeon-in-chief at the Charity Hospital there. Science is indebted to him for new instruments invented, and new methods of forming artificial noses, eyelids, lips, etc., and of curing stammering and squinting. Among his works are *Chirurgische Erfahrungen* (1829–34); *Ueber die Durchschneidung der Sehnen und Muskeln* (1841); and *Der Æther gegen den Schmerz* (1847).

DIEGO-SUAREZ BAY. See MADAGASCAR, Vol. XV, p. 168.

DIEL DU PARQUET, JACQUES, a French colonizer and colonial governor; died at St. Pierre, Martinique, Jan. 3, 1658. The date of his birth is unknown. He was a nephew of Pierre d'Enambuc, the colonizer of St. Christopher and Martinique, who, in December, 1638, gave him an appointment as commandant of the latter island, which was quickly confirmed by the French "Company of the American Islands." He was made lieutenant-general and seneschal, and received a grant of thirty pounds of tobacco for each inhabitant. As governor of Martinique he was beset with many difficulties, but confronted them with wisdom and vigor; introduced the culture of the sugar-cane in 1639, and by 1642 had led his people far in the direction of general prosperity, when the island was devastated by a terrible hurricane. In June, 1650, he purchased the island of Grenada from a Carib chief for a few necklaces and casks of brandy, and distributed the lands among his colonists. The vendors, soon repenting of their bargain, made an attack, and were nearly exterminated in the slaughter which ensued. In September of that year he purchased Grenada and its adjacent islets, and also Martinique and St. Lucia from the French government. In 1654, some Hollanders, expelled from Portugal, came from Brazil and desired to join his colony, but by the influence of the Jesuits, who had been there since 1640, were repelled. The same year the Caribs, under the lead of a half-breed, attempted to exterminate the French. Parquet afterward lost St. Lucia, in a sudden attack by the English. Grenada was several times ravaged by the Caribs, and as the French made reprisals, the is-

land became a scene of fire and carnage. In 1656 he was surrounded and beset, when a Dutch fleet arrived, by whose aid he put the savages to flight; and in 1657 they made submission. By his considerate administration he was the first to show to the American natives an example of moderation.

DIELECTRIC. See ELECTRICITY, Vol. VIII, p. 36; also ELECTRICITY, § 7, in these Supplements.

DIELMAN, FREDERICK, a German-American painter; born in Hanover, Germany, Dec. 25, 1847; graduated at Calvert College, Maryland, 1864; served six years in the United States Topographical Engineers, chiefly in Virginia; afterwards studied at the Royal Academy, Munich, and in 1876 established his studio in New York city. He became a member of the Society of American Artists, of the National Academy, of the Tile Club, and of the Society of Water Colors, and achieved fame as an illustrator. *Patrician Lady; A Girl I Know;* and *Young Gamblers* are among his best-known pictures. He designed the two mosaic panels, "*History, Mythology, and Tradition,*" and "*Law,*" in the Library of Congress, Washington.

DIES IRÆ, the name and initial words of one of the Latin hymns of the church, which vividly portrays the experience of death and judgment that must come to every man, and which is acknowledged to be the great mediæval masterpiece of sacred song. It is in constant use at the present time by the Roman Church as part of the solemn requiem, or mass for the souls of the dead, and is a favorite with Protestant Christians of all denominations. This hymn was written by Thomas de Celano, a Neapolitan Franciscan of the thirteenth century, who was the friend, disciple and biographer of St. Francis d'Assisi, and has the threefold distinction of being the one most frequently used in divine worship throughout the civilized world; the hymn oftenest imitated and translated; and the hymn, which, more than any other, appeals to all classes of men. Not less than 150 meritorious translations of it into the English language have been made, but not one of them has the simple grandeur of the original. Some of the most notable English translations are those by John Sylvester (1621); Richard Crashaw (1646); Drummond of Hawthornden (1656); and in more recent times those by Sir Walter Scott, Lord Macaulay, Archbishop Trench, Dean Alvord, Dean Stanley, and by the following American authors: W. R. Williams (1843); H. H. Brownell (1847); Abram Coles (1847, etc.); William Giles Dix (1852); Gen. John A. Dix (1866 and 1875); Edward Slosson (1866); M. H. Bright (1866); E. C. Benedict (1867); S. W. Duffield (1870); Charles W. Elliot (1881), Henry C. Lea (1882); H. L. Hastings (1886); and W. W. Nevins, who made twelve excellent renderings (published by Putnam, 1895). In England, those by Dr. W. J. Irons and Dean Stanley, and in America those by Gen. John A. Dix and Edward Slosson, are the most popular. Gryphius (1650), Schlegel (1802), Fichte (1813), Follen (1819), Brunow (1833), and Daniel (1839), are among the distinguished German translators.

DIESKAU, JOHN ERDMAN, BARON, a soldier of Saxony who served under Marshal Saxe, and afterward at the head of French troops in Canada; born in 1701; died in Surenne, France, Sept. 8, 1767. He was a major-general in the French service, when, in 1755, with about a thousand French and Indians, he entered Lake Champlain to attack Fort Edward, and surprised and defeated the New England troops, under Colonel Williams, sent to oppose him. In the pursuit which followed the victory, his Indians failed him and a desperate conflict with the British ensued, in which, after losing all his men and being severely wounded, he was made a prisoner. After being exchanged in 1763, he returned to France, where he received a pension for meritorious services, and eventually died of his wounds.

DIESTERWEG, FRIEDRICH ADOLPH WILHELM, a German educator; born Oct. 29, 1790, at Siegen, Prussia; died at Berlin, July 7, 1866; studied philosophy, mathematics and history at Tübingen and elsewhere, and settled at Mannheim as private teacher. He became second professor in the secondary school at Worms in 1811; professor in the "Model" school at Frankfort on-the-Main in 1813; principal of the Latin school at Elberfeld in the same year, and in 1820 director of the normal school at Moers. In 1832 he was called to be superintendent of education in the city schools of Berlin. For political reasons he was partially relieved of these duties in 1847, and wholly retired in 1850; but devoted himself to the cause of education during the remainder of his life. In 1858 he was elected to the Landtag. He early adopted the theories of Pestalozzi, whose life he published in 1846; and the building up of common schools and the training of teachers were his chosen work. He was the author of many schoolbooks, chiefly relating to geometry and algebra, and of *Inspection*; *Stellung und Wesen der Neuen Volkschule* (1846); *Praktischer Lehrgang für den Unterricht in der Deutschen Sprache* (1845); and other publications.

DIET. See DIETETICS, Vol. VII, pp. 200–213.

DIETERICI, FRIEDRICH HEINRICH, a German Oriental scholar; born in Berlin, July 6, 1821; studied at Halle and Berlin, and after publishing a Persian poem, *Mutanabbi et Serfeddaula* (1847), visited Cairo, where he studied Arabic at the school of a sheik; then traveled through Upper Egypt, Mt. Sinai and Palestine, and returned by way of Constantinople, Athens and Trieste. In October, 1850, he was made assistant professor at Berlin, and in March, 1852, interpreter of the embassy from London to Constantinople. In 1851 he published an edition of the Arabic text, of Alfiyyah, and a grammar in Arabic text, with the commentary of Ibn Akie, and afterward published *Anthropology of the Arabs*, and many other works concerning the Arabian people and literature.

DIETRICH OF BERNE, a name given to Theodoric the Great in the ancient heroic poems of Germany, in many of which he is a central and principal figure. Berne signifies Verona, his capital. *Alphart's Tod; Dietrich's Ahnen;* and *Dietrich's Flucht*, are the titles of some of the poems. He figures in the *Niebelungenlied.*

DIETRICHSON, LORENTZ HENRIK SEGELCKE, a

Norwegian poet and critic; born at Bergen, Jan. 1, 1834; passed a portion of his youth in traveling; settled in Sweden in 1859; became docent at the University of Upsala in 1861; amanuensis at the National Museum in 1866; art teacher at Stockholm in 1868; and teacher in the Manual Training School in 1870. In 1875 he was made professor of the history of the fine arts at Christiania. His works, chiefly on art-history, are written, some in the Swedish language, some in the Norwegian, the best known being *Outlines of the History of Norsk Poetry* (1866).

DIEULAFOY, Marcel Auguste, a French archæologist; born Aug. 3, 1844; distinguished for his learned and fruitful researches in the antiquities of Persia. His magnificent works, *Ancient Art of Persia* (1884–89) and *Acropolis of Susa* (1890), are well known. His wife, also an enthusiastic archæologist, published *Persia, Susiana and Chaldæa* (1866) and *At Susa* (1887).

DIFFERENCE-ENGINE. See Calculating-machines, Vol. IV, pp. 654, 655.

DIFFERENTIAL. See Infinitesimal Calculus, Vol. XIII, p. 13.

DIFFERENTIAL THERMOMETER, an instrument for determining very minute differences of temperature. Leslie's differential thermometer consists of two glass bulbs containing air, connected by a bent tube containing some sulphuric acid, the movement of which, as the air expands and contracts, serves to indicate any slight difference of temperature between the two bulbs.

DIFFERENTIATION, of molecules. See Atoms, Vol. III, pp. 44, 45. In biology. See Biology, Vol. III, pp. 682, 683.

DIFFRACTION. See Wave Theory, Vol. XXIV, p. 454.

DIFFUSION. See Chemistry, in these Supplements.

DIGAMMA, an obsolete letter of the Greek alphabet, resembling the English F, and equivalent in sound to the English *w*.

DIGBY, a seaport town, county seat of Digby County, western Nova Scotia, situated on an inlet of the Bay of Fundy. Shipbuilding is carried on, and large quantities of herring and mackerel are exported. Population 1891, 1,381.

DIGBY, George, Earl of Bristol, an English politician and author; born in Madrid, Spain, where his father was English ambassador, in 1612; died, in 1676. He was a turncoat in politics, alternately siding with the Commonwealth and with the Royalists, and while in exile in France and Spain he became a Catholic. Upon succeeding to the title he sat in the House of Lords after the restoration of Charles II. He published *Speeches* (1640, 1641 and 1674); was the author of *Elvira: A Comedy* (1642); and also published *Letters Between Lord George Digby and Sir Kenelm Digby Concerning Religion* (1651).

DIGBY, Kenelm Henry, an English author, born in 1800, was the youngest son of the dean of Clonfert. Having entered Trinity College, Cambridge, he took his B.A. in 1819, and three years later published the *Broad Stone of Honor*, "that noble manual for gentlemen," as Julius Hare called it; "that volume which, had I a son, I would place in his hands, charging him, though such admonition would be needless, to love it next to his Bible." It was much altered and enlarged in the 1828 and subsequent editions (the latest 1877), its author having in the mean time turned Catholic. He died in London, where most of his long life was spent, March 22, 1880. Of 14 other works (32 vols., 1831–74) the last eight were poetry.

DIGEST. See Justinian, Vol. XIII, pp. 793–795.

DIGESTER, Papin's Steam. See Papin, Vol. XVIII, p. 228.

DIGGES FAMILY, The, an English family which for several generations was honorably represented by scholars and authors. (See Telescope, Vol. XXIII, p. 135.)—Leonard Digges, a gentleman of good family and some means; born at Barham, Kent; educated at Oxford; devoted himself to geometry and its practical applications during a life of retirement at his ancestral home; died in 1574. He was author of *Tectonicum* (1556), a work relating to the measurement of lands, stone, timber, etc., and of *A Prognostication Everlasting of Right Good Effect; or, Choice Rules to Judge of the Weather by Sun, Moon, Stars, etc.* (1555–56, 1564).—Thomas Digges, son of Leonard, educated at Oxford, seems to have had a military career, and became eminent as a mathematician. He died in 1595. Among his works were *Alæ sive Scalæ Mathematicæ* (1573), "an arithmetical military treatise, containing so much of arithmetic as is necessary towards military discipline," and *Stratioticos*, an arithmetical, warlike treatise—teaching the science of numbers—with so much of the rules of equations algebraical and equations cossical as are requisite for the profession of a soldier.—Sir Dudley Digges, eldest son of Thomas; born 1583; died 1639; educated at Oxford; an accomplished politician and elegant writer; is chiefly remembered for *The Compleat Ambassador*, a collection of letters between the ministers of Queen Elizabeth respecting her projected marriage with the Duc d'Anjou, published in 1655, after his death. In 1610 he appears as a friend of the navigator Hendrik Hudson, contributing money to equip his fleet. In 1618 he was ambassador at Rome; 1621, member of Parliament; 1630, Master of the Rolls; and in 1631, one of a committee appointed to consider Virginian affairs.—Edward Digges, son of Sir Dudley; born in England, 1620; died in Virginia, March 15, 1675; a resident of Virginia; employed Armenians to introduce the culture of the silk-worm in the valley of the James River, and was governor of Virginia during a portion of the year 1655. He then went to England to adjust a controversy between that colony and Lord Baltimore.—Dudley Digges, another son of Sir Dudley; born 1612; died 1643; was author of a treatise on the *Illegality of Subjects Taking Arms Against Their Sovereign.*

DIGHTON ROCK, a mass of granite weighing nearly ten tons, with dimensions about six by eleven feet, and rising four feet above the ground, lying just above the water on the east bank of Taunton River, in the town of Berkeley, Bristol County, Massachusetts. Its front is deeply cut with mysterious characters, which have apparently undergone no change

since first observed from the deck of a passing vessel by the early colonists. The rock is mentioned, with drawings of the inscription, in a letter from Cambridge to Sir Hans Sloane, dated Dec. 18, 1730, which is now in the British Museum; and it is also described by Edward A. Kendall in his *Travels Through the Northern Parts of the United States in 1807–08*. Many antiquarians believe that it is a runic inscription left by the Norsemen under Thorfinn, to record their visit to America, A.D. 1008. It was purchased, with the surrounding land, in 1857, for Ole Bull, the Norwegian violionist, and after his death was presented to the Royal Society of Antiquaries of Copenhagen, by whom it was, in 1890, ceded to the Old Colony Historical Society of Taunton, Massachusetts. J. J. Worsae, the eminent antiquarian of Stockholm, denies that the inscriptions are Runic or Norsk, and seems to favor the Indian tradition that it commemorates the massacre of some white men who arrived in a ship many years ago, and who, after seizing some of the natives as hostages, incautiously went ashore to a spring for water, and were overpowered.

DIGITIGRADA. See MAMMALIA, Vol. XV, pp. 359, 434.

DIHONG OR LANPO, a river of Tibet, which forms the upper part of the Brahmaputra. It rises on the northern side of the Himalayas, in western Tibet, flows for one thousand miles east, then bursts through the great mountain chain into India, where it receives the other name. See TIBET, Vol. XXIII, p. 341.

DIJON MUSTARD. The celebrated Dijon mustard is worthy of note as a manufacture. Its peculiar quality is a certain piquancy not found in any other mustard. The seed is always sown on cleared charcoal-beds in forests, and the soil gives one peculiar flavor to the mustard; another flavor is differently accounted for. The mustard, when in powder, is mixed with the juice of new wine, lending that pleasant acidity with which we are familiar. But to obtain precisely the degree of acidity, it is necessary that the grape be always in precisely the same state of unripeness, a degree more or less making all the difference.

DIKE, SAMUEL WARREN, an American clergyman devoted to the study of sociology; born at Thompson, Connecticut, Feb. 13, 1839; graduated at Williams College in 1863 and at Andover Theological Seminary a few years later. After devoting some fifteen years to the ministry, he became prominent as an advocate of reform in the laws relating to marriage and divorce in his own and other countries, and compiled a mass of information with reference thereto at the request of Carroll D. Wright, Commissioner of the Bureau of Statistics, besides contributing many articles on the same subject to magazines and reviews. See DIVORCE and MARRIAGE, in these Supplements.

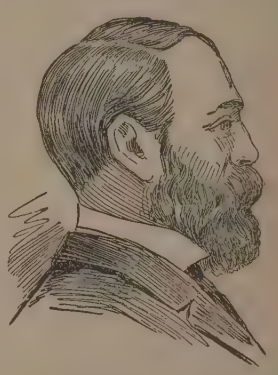
DIKE OR DYKE, in engineering. See HOLLAND, Vol. XII, pp. 59, 60. In geology, see GEOLOGY, Vol. X, p. 312.

DILATOMETER, an instrument for determining the expansion of liquids. The ordinary form consists of a globe bearing a graduated tube. If petroleum is to be tested, several dilatometers may be filled and immersed at once in an oil bath, the oil being heated and maintained at a certain temperature for at least fifteen minutes. At the end of this time the lid of the bath is raised and the increase in the volume of the oil in the tube is read like the mercury in a thermometer. The tube of the dilatometer is quite small, and in order to fill it, an air-pump has to be used to exhaust the oil, a very fine flexible tube being inserted for that purpose. All bubbles have to be carefully removed, and the tube must be cleaned by careful wiping. After use, the dilatometer may be emptied by a reverse process, air being blown in, followed by ether, to completely cleanse the apparatus.

C. H. COCHRANE.

DILETTANTE, an Italian expression for a lover of the arts and sciences, who devotes his leisure to them as a means of amusement and gratification. In 1734 a number of gentlemen formed in London a "Dilettanti Society," which published a splendid work on *Ionian Antiquities* (1769–1840); and *Specimens of Ancient Sculpture, Egyptian, Etruscan, Greek and Roman* (1809–35), *The Temples of Ægina and Bassæ* (1860); etc.

DILKE, SIR CHARLES WENTWORTH, an English politician and author, was born at Chelsea, London, Sept. 4, 1843; a grandson of Charles Wentworth Dilke, proprietor and editor of *The Athenæum*, whose *Papers of a Critic* Sir Charles edited in 1875, and son of Sir C. W. Dilke, one of the active originators of the great exhibition of 1851, and British commissioner to the New York Industrial Exhibition of 1853. Sir Charles was educated at Cambridge, where he graduated as "senior legalist" in 1866, and in the same year was called to the bar. During 1866–67 he made a tour of English-speaking and English-governing countries, including the United States, Canada, Australia, New Zealand and India, the results of which appeared in a cleverly written record of travel, under the title of *Greater Britain*. This work, which met with instant and signal success, treated the new subject of the influence of race on government, and of climatic conditions upon race, and won praise for its author as an acute and highly intelligent observer on imperial and colonial questions. In 1868 he entered Parliament as member for Chelsea. A doctrinaire Radical in politics, in 1871 he was attacked for holding republican opinions when he avowed his preference for a republican form of government to a constitutional monarchy. Despite this fact, he held office under the crown, being Under-Secretary of State for Foreign Affairs, and president of the Local Government Board, with a seat in Mr. Gladstone's Cabinet.



SIR CHARLES DILKE.

In 1881–82 he was chairman of the royal commission for the negotiation of a commercial treaty with France. In 1885 he carried the Diseases Prevention Act through Parliament. He was also concerned with legislation creating the metropolitan school boards, directly elected by the rate-payers, and for conferring the municipal franchise on women. In 1885, in consequence of the disgraceful exposure of the Crawford divorce case, in which he was named as a co-respondent, he was defeated in a contest for a Parliamentary seat in Chelsea, and began to devote himself more to literary work and travel, and to the study of questions bearing upon the European and colonial policy of Britain, her military strength, the imperial defenses, etc. His chief publications, besides *Greater Britain*, already noted, are an anonymously published satire, entitled *The Fall of Prince Florestan of Monaco* (1874); *Two Recess Speeches* (1876); *The Eastern Question* (1878); *Parliamentary Reform* (1879); *The Present Position of European Politics* (1878); *The British Army* (1888); *The Problems of Greater Britain* (1890); and, conjointly with Spencer Wilkinson, a volume entitled, *Imperial Defence* (1891). In 1892 he was returned to the House of Commons as member for the Forest of Dean, Gloucestershire. In 1885 he married Mrs. Mark Pattison, widow of the late rector of Lincoln College, Oxford, herself a writer and author of several clever stories.

DILKE, Emilia F., an English authoress; born at Oxford in 1842; married the Rev. Mark Pattison, rector of Lincoln College there, in 1862, and after his death 1884, married, in 1885, Sir Charles W. Dilke. During many years she wrote the art criticisms in the *Athenæum*, and the articles on Italy and France in the *Annual Register*. She also wrote on trades unions for women, in the *Fortnightly Review* and in the *New Review*. Her *Life and Works of Claude Lorraine* (1879) shows a judicious and appreciative critical talent; and in *The Renaissance of Art in France* (1879) she treats with thoroughness a most difficult period of French art. Among her other works are *The Shrine of Death* (1866); and *Art in the Modern State* (1888).

DILLMANN, Christian Friedrich August, a German theologian and Orientalist; born at Illingen, Würtemberg, April 25, 1823; died July 4, 1894; educated at Stuttgart, Schönthal and Tübingen; became a parish vicar at Tersheim in 1845; made researches among the libraries of Paris, London and Oxford in 1846–48; filled various posts of honor at the universities of Tübingen, Giessen and Kiel; edited a number of catalogues of Oriental and Ethiopic manuscripts; translated and explained the *Book of Enoch* (1853); published a *Grammar of the Ethiopic Language* (1857), and a lexicon of the same (1865); and undertook an edition of the Old Testament in that language. In 1869 he resigned his chair at Giessen to become the successor of Hengstenberg, at Berlin. The author of numerous works on Ethiopic themes, he was unquestionably the first authority in Europe on those languages. He possessed a magnificent Oriental library of 5,000 volumes, which has been acquired by the Johns Hopkins University, at Baltimore.

DILLON, a city and the capital of Beaver Head County, southwestern Montana, 100 miles S.S.W. of Helena, on the Beaverhead River, and on the Union Pacific railroad. It is a shipping-point for the country for 15 miles about, exporting ore, wool, cattle, sheep and farm products. Population 1892, 1,500.

DILLON, John, an Irish politician, son of John Blake Dillon; born in Blackrock, County Dublin, in 1851; educated at the Catholic University of Dublin; entered Parliament for Tipperary, 1880; became an active supporter of Mr. Parnell, and was the first on the list when, Feb. 2, 1881, the entire Parnell party was suspended. He resigned in 1883; was elected for East Mayo in 1885, and again in 1886. He was twice imprisoned under the Coercion Act of 1881, and in 1886, while executing the "plan of campaign," was arrested at Loughrea and bound over to keep the peace. In 1888 he was sentenced to six months' imprisonment in Tullamore jail. He afterward traveled in Australia; returned in 1890, and was arrested on a political charge, forfeited his bail, escaped with William O'Brien to Cherbourg and thence went to the United States, where he was received by the friends of Mr. Parnell. He surrendered in 1891, and, after a brief imprisonment, declared in favor of Parnell's retirement from the leadership of the Irish party. Later he reëntered Parliament, and on the resignation of Justin McCarthy, in Jan., 1896, he was elected leader of the Anti-Parnellites, and was reëlected in 1897, 1898, and 1899.

JOHN DILLON.

DILLON, John Blake, an Irish politician; born in Mayo in 1814; died in 1866. He studied theology at Maynooth, and law at Dublin, and was called to the bar in 1842. He helped to found the *Nation* newspaper, was member of Parliament for Tipperary, a prominent member of the Young Ireland party and one of the rebels of 1848, after the failure of which movement he escaped to the Arran Islands; thence to France, and later to the United States, where he practiced law in New York City. He returned to Ireland, and was elected to Parliament in 1865.

DILUVIUM, distinguished from alluvium. See Alluvium, Vol. I, p. 589.

DIMINUTIVES, in grammar, words having a special affix expressive of littleness, or of the ideas of tenderness, affection, contempt, etc., commonly associated therewith. In English, the terminations *-kin*, *-ling*, and *-et*, as in napkin, gosling, and pocket, are examples of common diminutives.

DIMITY, a heavy, fine, white cotton fabric with a crimped or ridged surface; plain, striped, or cross-barred. The term is derived from the Greek *dimitos* (made with a double thread). The Greek cloth is believed to have been a kind of twilled goods. Modern dimity is used for women's dresses and in fancy draperies.

DIMORPHISM, in botany, is a term expr ssing

the fact that a plant produces two forms of flowers related to each other in the work of pollination, frequently called *heterostylism*, as it involves reciprocal lengths of styles and stamens. In one form of flower the style is short and the stamens are long; in the other, the style is long and the stamens are short; but the long styles correspond in position to the long stamens, and the short styles to the short stamens. An insect visiting one of these flowers will receive pollen upon that portion of its body which will brush against the stigma of its own length in the reciprocal flower. It is found that if pollen from a short stamen be placed upon the stigma of a long style, or *vice versâ*, it will be completely ineffective, or, in any event, not nearly so effective as the pollen upon a stigma of its own length. In this way, close-pollination is practically prevented, and cross-pollination necessitated. As examples of dimorphic or heterostylic flowers, species of *Houstonia*, *Primula*, *Linum*, and *Polygonum* may be cited. This relationship is still more complex in *trimorphic* flowers, such as species of *Oxalis*, *Lythrum*, *Salicaria*, etc., in which there are reciprocal stamens and styles of three lengths, and hence three forms of flowers.

The term *dimorphism* has also a wider application, and is sometimes made to include a condition in which two forms of flowers are produced, but which do not involve heterostylism. For example, in the cases of *cleistogamous* flowers, these apparently abortive but really very productive flowers are formed in addition to the ordinary more showy flowers of the plant, which thus has flowers of two forms, and may be said to be dimorphic as to its flowers. A still wider application of the term makes it include all those plants in which the phenomenon of alternation of generations appears. Such plants—and they include all plants but the lower Thallophytes—have two alternating forms of plant body, the *gametophyte* and the *sporophyte*, and hence may well be called dimorphic. See SEX, Vol. XXI, p. 721. J. M. COULTER.

DIMORPHITE, a mineral. See MINERALOGY, Vol. XVI, p. 394.

DIMSDALE, THOMAS, an English physician; born in Essex, May 6, 1712; settled at Hertford, and, having become famous through his advocacy of inoculation for smallpox, visited Russia by invitation in 1768, and became court physician, with the title of baron. The Empress Catherine and the Grand Duke Paul were inoculated by him. After returning to England he became a banker, was twice elected to Parliament, and died at Hertford, Dec. 30, 1800. He published treatises on *Inoculation* in 1767 and 1776.

DINARIC ALPS, a mountain range of Austria, connecting Mount Kleck at the southeast extremity of the Julian Alps with the western extremity of the Balkan range. It runs from northwest to southeast, through Croatia, forming the eastern frontier of Dalmatia, while a western branch covers much of that country. One of its highest peaks, Mount Dinara (6,010 feet), so called from the Celtic *Din*, or *Dinas*, a fortified height, gives name to the range. See also ALPS, Vol. I, p. 622.

DINDINGS. See STRAITS SETTLEMENTS, Vol. XXII, p. 587.

DINDORF, WILHELM, a German philologist, whose scholarship combined elegant taste with profound learning; born Jan. 2, 1802, at Leipsic, where his father was professor of Oriental languages; entered the university at 15, and by his acquirements soon gained the friendship of many distinguished scholars. He was appointed custodian of the Royal Library at Berlin in 1827, and professor of literary history at Leipsic in 1828, but resigned in 1833 to devote himself wholly to literary work. With L. and M. Hase he reëdited the *Thesaurus* of Stephen; and afterward edited *Demosthenes*, *Æschylus*, and other Greek authors for the University of Oxford, and many volumes in Didot's Paris *Library of the Greek Classics*. He died at Leipsic, Aug. 1, 1883.

DINGELSTEDT, FRANZ VON, a German poet and dramatic author; born June 30, 1814, at Halsdorf, in Hesse; became royal librarian at Stuttgart in 1843, director of the theater in Munich in 1850, and later director of the Court Opera House in Vienna. Died in that city, May 15, 1881.

DINGLEY, NELSON, JR., journalist and statesman; born in Durham, Me., Feb. 15, 1832; graduated at Dartmouth in 1855; called to the bar in 1856, but never practiced. From 1856 till his death he was proprietor and editor of the *Journal*, of Lewiston, Me., which he made the leading Republican paper of the state. From 1861 to 1873 he was six times elected to the Maine legislature; was speaker in 1863–64; and governor of the state in 1874–75. In Sept., 1881, he was elected to Congress as a Republican; and was reëlected every term thereafter till his death. He helped to frame the McKinley tariff act of 1890; opposed the Wilson tariff bill of 1894; and as chairman of the ways and means committee framed the Dingley tariff act of 1897. In July, 1898, he was appointed a member of the Canadian-American Joint Commission. Died in Washington, D. C., Jan. 13, 1899.

DINGO, a wild dog of Australia. See DOG, Vol. VII, p. 325.

DINICHTHYS HERZERI. See OHIO, Vol. XVII, p. 735.

DINKA, an African race. See AFRICA, *ante*, p. 67.

DINOMYIDÆ. See MAMMALIA, Vol. XV, 420–21.

DINOSAURIA. See REPTILES, Vol. XX, 742–43.

DINSMOOR, ROBERT (1757–1836), an American poet, who fought in the Revolutionary war, and then became a farmer. His writings are short poems, mostly in the dialect of his ancestors, the Scotch.

DINWIDDIE, ROBERT, lieutenant-governor of Virginia; born in Scotland in 1690; died in Clifton, England, Aug. 1, 1770. He began his career as a clerk to a collector of customs in the West Indies, and was appointed lieutenant-governor of Virginia in 1752, in reward for having exposed frauds committed by his employer. His first act was to divide the militia of his colony into four districts. One of these he gave to the command of Major George Washington, whom he sent to order the French, who were establishing military posts south of Lake Erie, to leave the British domain. He also urged the assembly to prevent the encroachment of the French.

After increasing the troops, he made Washington lieutenant-colonel, but Washington resigned when Dinwiddie resolved to place the new forces under royal officers, and to permit no native-born officer to take higher rank than that of captain. Dinwiddie had many disputes with the assembly, and was charged with embezzlement and avarice. He returned to England with great wealth in 1758.

DIOCLETIAN ERA. See CHRONOLOGY, Vol. V, p. 716.

DIODATI, GIOVANNI, a Protestant theologian; born at Geneva Switzerland, June 6, 1576; died there, Oct. 3, 1649. He was a protégé of Beza, and became a Hebrew professor at the age of 21; professor of theology ten years later; and was sent from Geneva as a deputy to the Synod of Dort in 1618. He translated the Bible into Italian; Sarpi's *History of the Council of Trent* into French; and was the author of annotations on the Bible, and of a number of polemic works against the Roman Church.

DIODON. See GLOBE-FISH, Vol. X, p. 685.

DIOMEDE ISLANDS. See BEHRING'S STRAIT, Vol. III, p. 510.

DIONÆA. See INSECTIVOROUS PLANTS, Vol. XIII, p. 136.

DIONYSIUS, SAINT. See DENIS, Vol. VII, p. 79.

DIONYSIUS THRAX, a classic author, a native of Thrace, who taught rhetoric at Rome about 75 B.C. See GRAMMAR, Vol. XI, pp. 37, 43.

DIOPHANTUS. See ALGEBRA, Vol. I, p. 511.

DIOPTRIC SYSTEM. See LIGHTHOUSE, Vol. XIV, pp. 619–23, 629.

DIORAMA, an exhibition invented by Daguerre in 1822, and given in London and Paris, in which a combination of both transmitted and reflected light was used to show large colored pictures to an assembly of spectators. See DAGUERRE, Vol. VI.

DIORITE ROCK. See GEOLOGY, Vol. X, 235.

DIPLACANTHUS, a genus of fossil ganoid fishes peculiar to the Old Red Sandstone, in which six species have been found. The body was covered with very small scales, and the tail was heterocercal. There were two dorsal fins, which, with each of the other fins, were furnished with a strong spine in front, the base of which was simply imbedded in the flesh, as in the dogfish, and not articulated, as in the siluroids. The head was large and the mouth wide and opening obliquely.

DIPLOGRAPTUS, a genus of fossil hydroids (*Cœlenterates*) belonging to the Graptolites. The colong consisted of a stalk with a double row of hydranths. It resembled the well-known sertularians. The fossils are from the Silurian shales.

DIPLOMATIC AGENTS, functionaries commissioned to represent one state at the capital of another, or to negotiate with that other state concerning national affairs. Ancient Greece, Rome, Persia, etc., used political agents to discuss their national affairs; but, as the civilized world was then often confined within the limits of a single empire, the science of diplomacy, as known in modern times, did not exist; and the diplomatic agent of the present day is the product of a policy of statecraft which was initiated in the sixteenth century.

Ambassadors were the original diplomatic agents of modern civilized nations, but as they were supposed to represent the person of their sovereign, the execution of their business was often retarded by ceremonious formalities. To avoid this disadvantage, agents were appointed under the name of *resident ministers;* and it was these "envoys of the second degree" who were first intrusted with permanent missions at foreign courts. In the sixteenth century their duties involved deceit, trickery, and espionage into the secrets of the nation to which they were accredited, in order to serve the personal schemes of their sovereign. But by the eighteenth century three classes of diplomatic agents had been developed: ministers plenipotentiary, resident ministers, and *chargés d'affaires.* (See AMBASSADOR, Vol. I, pp. 657–59, and *ante*, pp. 149–50.)

To these classes was added in 1818, by the protocol of Aix-la-Chapelle, that of "ministers resident," who rank between envoys and *chargés d'affaires.* These are accredited from one sovereign to another; but the *chargés d'affaires* receive credentials from the minister of foreign affairs of their own country, addressed to a similar officer of the government to which they are accredited. The foregoing classification omits certain diplomatic agents of irregular status, such as semi-official agents sent by non-recognized governments. Such agents are not members of the diplomatic corps. It also omits commissioners to fix boundaries or adjust claims; also great personages, charged with important missions, who desire to avoid useless ceremonies without sacrificing their rank and position.

Diplomatic agents are exempt from arrest, and, generally speaking, from the jurisdiction of the courts of the country to which they are accredited; and straightforward honesty in their intercourse with the government of that country, and non-intervention in its internal affairs, are necessarily required of them.

Consuls, who are government agents sent abroad to facilitate commercial intercourse between their own country and the city or port to which they are sent, are sometimes intrusted with certain duties which carry the title of diplomatic agent, or *chargé d'affaires*, and in such cases they are furnished with a letter of credence to secure recognition of their diplomatic authority, in addition to their commission as consul. The constitution grants to the supreme court of the United States original jurisdiction in all cases affecting diplomatic agents and consuls.

DIPLOPHANTINE ANALYSIS, that section of the theory of unlimited or indeterminate problems which attempts to find rational and commensurable values answering to certain equations between squares and cubes.

DIPNOI. See ICTHYOLOGY, Vol. XII, p. 686.

DIPPER. See OUSEL, Vol. XVIII, pp. 74, 75.

DIPPING-NEEDLE, a magnetic needle so suspended as to have a free vertical motion. If the vertical plane in which the needle moves is the magnetic meridian, the angle between the needle and a horizontal line is called the dip or inclination of the needle. In theory, there can be no dip at the magnetic equator, but a dip of 90° should be found

at the magnetic pole. From observations with a carefully adjusted dipping-needle Sir J. C. Ross, in 1831, fixed the magnetic pole in Boothia Felix, near lat. 70° N. and long. 96° W., where he found the dip to be 89° 59′, or nearly perpendicular.

DIPSAS, a genus of harmless tree-serpents living in the tropical regions of both hemispheres. The name, signifying thirst, arose from an ancient myth that the animal was driven by an insatiable thirst to inhabit springs, where it awaited an opportunity to bite a victim, and impart a thirst which only death could quench.

DIPTEROCARPUS, a genus of mostly large trees of tropical Asia, which receives its name from the large wings attached to the fruit, and which gives its name to the family (*Dipterocarpaceæ*). These peculiar wings are largely developed sepals. The trees are mostly very large and handsome, with hard wood, and yield an abundant resin. Some of the species are known as "gurjun trees."

DIPTERUS, a genus of fossil ganoid fishes, found in Devonian formations. They approach the lung-fishes (*Dipnoi*) in many points of structure.

DIRECTORY, in French history. See FRANCE, Vol. IX, pp. 608, 609.

DIRK-HARTOG ISLAND, an island off the western coast of Australia, lat. 26° S., long. 113° E. With two smaller islands it forms the breast-work of Shark's Bay, one of the most commodious inlets on that coast.

DISABILITY, LEGAL, is either absolute, which wholly disables the person from performing any legal act—for example, outlawry, excommunication, attainder, alienage—or partial, such as infancy coverture, lunacy, drunkenness, and the like. It may arise from the act of God, of the law, of the individual himself, or of his ancestors, or the person from whom he inherits.

DISAPPOINTMENT, CAPE, OR CAPE HANCOCK, the most southwestern point of land of Pacific County, southwestern Washington, at the mouth of the Columbia River. It has a lighthouse, with a fixed white light, 232 feet above sea-level, at lat. 43° 33′ 56″ N., long. 70° 11′ 41″ W. A second Cape Disappointment is the southern part of the island of South Georgia, lat. 54° 45′ S., long. 35° 50′ W.

DISCHARGE IN HIGH VACUA AND AT HIGH POTENTIAL. See ELECTRICITY, §§ 94, 95, in these Supplements.

DISCIPLES OF CHRIST OR CAMPBELLITES, an organization of Christians within the United States which in 1894 had nearly 5,000 ministers, 9,000 churches and 800,000 communicants; founded about 1812 by seceders from the Presbyterian Church of western Pennsylvania, who determined to reject creeds and dogmas and to accept the Bible as their only rule, and of whom Thomas and Alexander Campbell were leaders.

They have a congregational form of government, believe in immersion as the only true baptism, but administer the Lord's Supper every Sunday, without inquiry as to whether those present have been immersed or not. They believe in the Holy Trinity, in the divine inspiration of the Holy Scriptures, in the moral depravity of the human race and its need of a new birth, in the church of Christ as a divine institution, in the fullness and freeness of the Gospel to all who will embrace it, and in the everlasting punishment of the wicked. They have publishing houses in Cincinnati and St. Louis, about forty colleges in the Southern and Western states, foreign missions in India, Japan and elsewhere, a Chinese mission at Portland, Oregon, and churches in Great Britain, Sweden and Australia. By means of two professorships which they support, they have provided for instruction in the English Bible at the University of Michigan.

DISCIPLINE, CHURCH. See EXCOMMUNICATION, Vol. VIII, p. 800.

DISCIPLINE, FIRST AND SECOND BOOKS OF. See PRESBYTERIANISM, Vol. XIX, pp. 679, 681.

DISCLAIMER, in law, is a renunciation by which a party renounces or disclaims some right or interest in property. Thus a patentee may renounce a part of his title to a patent, or a party may refuse to accept an estate which has been conveyed to him by deed or in a will. The widow frequently disclaims the interest conveyed to her by her deceased husband's will, for the reason that she prefers to take her dower interest in the property; and trustees may disclaim an estate conveyed to them in trust, when, for any reason, they do not care to execute the trust. In pleading, the term means a renunciation, by a defendant, of all interest in the subject-matter of the dispute or claim.

DISCOBOLI. See LUMP-SUCKER, Vol. XV, p. 65.

DISCO ISLAND. See BAFFIN'S BAY, Vol. III, p. 229.

DISCOVERY, in law, means the disclosure of facts in the knowledge of a defendant, or the production of documents for the use of the party making the demand therefor. Discovery may be had, in chancery proceedings, of matters of use to the complainant in sustaining his claim, and which he is not otherwise able to procure. Frequently, suits solely for discovery are instituted in courts of chancery, as a collateral proceeding to another suit then pending in that or some other court. In courts of chancery, however, relief and discovery may both be obtained in the same suit, thus rendering a supplemental proceeding to a suit in a chancery court for the purpose of discovery usually unnecessary.

DISCOVERY OF TERRITORY, a phrase to express the claim of right by which civilized nations have sought to possess themselves of newly discovered countries. There are many familiar examples of such claims in the history of America, Africa and Polynesia; and England, France, Spain, Portugal and Holland have often vied together in a headlong race to see which nation should first appropriate the inheritance of unsuspecting savages. In the time of Columbus, the pope of Rome gave unhesitating assent to such claims, and undertook to divide among certain favored nations, in advance, the right of acquiring territory by discovery in the unknown portions of the globe. In the present century the Oregon question, between the United States and Great Britain, was a controversy involving the right

of prior discovery, and the occupation of each newly discovered guano island in the Pacific Ocean affords an instance of its practical operation.

DISFRANCHISEMENT, in the ordinary use of the term, means the act of depriving a citizen of the right to vote. This cannot be done by public authorities. Frequently, criminals, or those who have been convicted of crime, are disfranchised by law, but the disability is generally only for a limited time, or is capable of being removed. Disfranchisement, as a legal term, means the act of depriving a member of a corporation of his right of membership by expelling him from the corporation. Corporations which are not for pecuniary profit have the right to expel their members as an incident to their corporate existence, but corporations which are maintained for profit have not this right, except when it is expressly granted by the charter. In any event, however, the right must be exercised only upon just cause, and after ample notice to the member, and opportunity to be heard. The power of disfranchisement can only be exercised by the corporation or society at large, unless the by-laws otherwise expressly provide. The remedy for wrongful expulsion is a writ of *mandamus* against the corporation to effect a restoration of the expelled member to his corporate rights.

DISHONOR OF A BILL. When the drawee, or person on whom the bill is drawn, declines to accept or to pay it, he is said to dishonor it. The act of drawing or of indorsing a bill implies an obligation to pay it in the last instance, and the person in whose favor it is drawn has thus recourse against the drawer and indorsers, should the drawee fail to accept or to pay. In order to preserve this recourse, however, it is indispensable that notice of dishonor shall be given to the drawer and indorsers. No particular form of notice is requisite.

DISK, a term of wide application in botany, but generally applied to an outgrowth of the receptacle of a flower, which often appears as a ring between the stamens and pistil, or as a cup more or less investing the pistil. Sometimes it carries up a set of organs, as the stamens, or both petals and stamens, or all the organs except the pistil, resulting in what is known as an *epigynous* flower, or one with an "inferior ovary." When the disk occurs it often functions as a *nectary*, secreting the characteristic nectar of insect-pollinated flowers.

DISPART, in gunnery, is a sight or projection cast upon the muzzle of a gun, and equal in height to half the difference between the diameters of the breech and of the muzzle; its object being to enable the gunner to obtain a line of sight from a cleft in the breech across the top of the dispart which shall be exactly parallel with the axis of the bore.

DISPENSARY, primarily, a room or place where medicines are compounded or dispensed, used to signify the places where medical treatment and medicines are supplied gratuitously, or nearly so, to the poor. In the latter case they serve not only as an outlet for philanthropic impulses, but to diminish the danger of pauperism, by restoring to health and the ability to labor the afflicted poor, and they act as a sanitary restraint for the community in checking incipient epidemics and relieving conditions that would otherwise tend to breed disease. The first recorded distinct dispensary was established in London in 1770, for "the relief of the sick poor, without regard to place of abode." It was an adjunct to St. Bartholomew's Hospital, and received governmental support. Its success led to the formation of similar institutions in other cities of England and the Continent. In England they became subject to Parliamentary regulation in 1805. The first dispensary in America was organized in Philadelphia in 1786, and was supported chiefly by the Society of Friends. In New York City the first dispensary was started by the New York Medical Society in 1791. In Boston their beginning was in 1796, under the auspices of the Chamber of Commerce. Baltimore followed in 1801. Since then they have spread to all the larger cities and towns.

In Germany, France and Austria any one can receive free treatment upon application. In England tickets are issued, after examining the worthiness of the applicant. There are, in England, also, many provident dispensaries (fifty in London in 1891) that are co-operative and self-supporting. Members pay a small sum monthly, for which they are entitled to medical treatment in case of sickness. In 1878, at a conference of delegates of the dispensaries in New York, it was decided to demand a nominal fee (ten cents) for each prescription, provided the applicant could pay. The fee was paid by about 85 per cent of the applicants, who, in 1891, numbered 452,429. In London the various dispensaries relieved (1891) 1,158,026 patients, or 274 to each 1,000 of the population. In most of the larger cities dispensaries are largely supported by the medical colleges.

DISRAELI, BENJAMIN. See BEACONSFIELD, EARL OF, in these Supplements.

DISSEN, GEORGE LUDOLPH, a German philologist, a pupil of Heyne; born Dec. 17, 1784; died Sept. 21, 1837; became professor at Göttingen in 1813; was deeply interested in the philosophy of Socrates and Plato, and at a later period devoted himself to classical exegesis and the development of a theory of the laws of style in poetry and speech. He published editions of *Pindar* (1830) and *Tibullus* (1835).

DISSENTERS, in Great Britain, the appellation for those Protestants who separate themselves on grounds of faith, or practice, from the established church. The term is of English origin, although its near equivalent may be said to have existed in Poland in the name of *Dissidents*, which first appears in the acts of the Warsaw Confederation of 1573, and there denotes the Polish Protestants, in contradistinction to the members of the established Catholic religion. After 1632 the term *Dissidents* was applied, in Poland, to all who were not Roman Catholics, as Lutherans, Calvinists, Greeks, Armenians, etc. In England, the term *Dissenters* appears to have come into use in the seventeenth century, as synonymous with *Nonconformists;* and from England its use was transferred to Scotland in the eighteenth century, after the secession church had been

founded in that country. The principle that none but persons professing the established religion were eligible for public office found expression in stringent legislation during the reigns of Elizabeth and Charles II, and dissenters remained under certain legal disabilities, which were only removed by acts of Parliament passed between 1828 and 1871; for an account of which, see TEST ACTS, Vol. XXIII, p. 199. For a list of 122 Dissenting religious denominations in England and Wales, see ENGLAND, Vol. VIII, pp. 246, 247.

DISSEPIMENT, in botany, the partition between two carpels in an ovary, or fruit composed of a number of carpels. A dissepiment is formed by the union of the sides of two carpels. Sometimes dissepiments meet in the center or axis, completely dividing the ovary or fruit into cells; sometimes they are partial, appearing as mere projections from the outer walls of the ovary or fruit, and leaving it one-celled. Many ovaries and fruits exhibit partitions not formed by the union of the sides of carpels; these are sometimes called *spurious dissepiments*, as in the pods of the *Cruciferæ*.

DISSOCIATION. See CHEMISTRY, Vol. V, pp. 475, 476; and ELECTROLYSIS, in these Supplements.

DISTANCE. The limit of view in a picture, or "point of distance," as it is called in perspective, is that portion of the picture where the visual rays meet, the "middle distance" being the central portion between the extreme distance and the foreground. The art of producing on the eye the effect of real distance, in so far as it is not accomplished by mere mechanical rules, is one of the most subtle branches of landscape-painting, and cannot be acquired otherwise than by long experience and a careful study of the effects of light and shade.

DISTEMPER, in painting. See TEMPERA, Vol. XXIII, pp. 157, 158.

DISTICH, the classical name given to any two lines, but especially to a hexameter and pentameter, making complete sense. It was much used by the Greeks and Romans as a vehicle for the expression of single thoughts and sentiments, and hence became almost exclusively employed for the classical epigram. The great poets of modern Germany, Goethe, Schiller, etc., have also shown a fondness for the distich, and remarkable skill in the use of it. A collection of moral maxims in Latin, ascribed to a certain Cato Dionysius, are called *Disticha*, and were highly popular during the middle ages.

DISTILLED WATER, water in its purest state, produced by condensation from steam. Impure and salt water may be passed through a "still" as steam, and by distillation be made drinkable, and this method of obtaining a water-supply is in use by navigators of the present day. Distilled water is especially necessary in chemical operations, where the presence of the foreign matters which ordinary water contains would be injurious.—DISTILLED WATERS is a term used to indicate such products as rose-water and lavender-water, which are obtained by distilling water and certain essential oils together.

DISTRIBUTING MACHINES. See TYPE-SETTING MACHINERY, in these Supplements.

DISTRICT ATTORNEYS. These officials represent the general government, in circuit and district courts, civil and criminal, and in the prosecution of crimes and misdemeanors. They resemble the public prosecutor in England and the *procureur de la république* in France. State attorneys occupy similar positions in regard to criminal prosecutions in each county of a separate state. District attorneys are appointed by the President. State attorneys are elected by popular vote.

DISTRICT OF COLUMBIA. (See COLUMBIA, DISTRICT OF, Vol. VI, p. 168.) Population 1880, 177,624; 1890, 230,392. In 1880 the city of Washington contained 147,293 inhabitants, and in 1890 it was co-extensive with the district. Prior to the year 1871 the affairs of the district were administered by Congress, but in that year the district was placed upon a territorial basis, Henry D. Cooke being governor from 1871 to 1873, and Alexander Shepherd from 1873 to 1874. Since 1874 the government has been in the hands of a local corporation, with an executive consisting of three commissioners, two of whom are appointed from civil life by the President of the United States, while the third must be an officer of the engineer corps, detailed for that purpose. Judicial officers, recorders and justices of the peace are also appointed by the President, while all subordinate municipal officers are appointed by the commissioners.

DITTANY, a name given to at least three strong-smelling plants: 1. In England, to *Dictamnus albus*, of the family *Rutaceæ*, having a short, five-parted calyx, five somewhat unequal petals, ten stamens, and five 1–3-seeded follicular capsules cohering at the base. The common dittany, or *D. fraxinella*, a native of sunny mountains and rocks and dry mountain forests of southern Europe, especially in calcareous soils, is very generally cultivated as a garden flower; 2. In the United States, to *Cunila Mariana*, a labiate plant of dry hills throughout the middle states; 3. To *Origanum Dictamnus*, a labiate plant of Crete, and probably the dittany of the ancients.

DIVIDEND is a part of the principal or profit distributed among the owners or other persons entitled thereto. The profits of a stock company are distributed to the stockholders in proportion to the respective amounts of their stock by means of dividends. Administrators and executors, trustees, assignees, receivers and other similar trust officers, upon whom the duty may devolve to administer insolvent estates, divide the proceeds derived from the sale or investment of assets by means of dividends.

DIVIDING-ENGINE. See GRADUATION, Vol. XI, pp. 29, 30.

DIVISIBILITY, that property of quantity, matter or extension through which it is either actually or potentially separable into parts. Whether matter is or is not indefinitely divisible is a question which has occupied the minds of philosophers since very early times. There is no doubt that, abstractly speaking, it is indefinitely divisible. We cannot conceive any body or space so small but that we can subdivide it in imagination, and thus figure to ourselves bodies and spaces still smaller; and practically we know that the subdivision of matter is carried in

nature far beyond appreciation either by our senses or by calculation. The diffusion of odors through the air, for long periods, from odoriferous bodies, without their suffering any sensible change of weight, and the tingeing of great quantities of fluid by very minute portions of coloring matter, are cases commonly appealed to in proof of the extreme fineness of certain material particles; while, by experiment, it is shown that there is no particular limit to the divisibility of even the most solid substances. Thus an ounce weight of silver, gilt over with eight grains of gold, has been drawn out into a wire 13,000 feet long, which was all its length covered with the gold; and a tube of glass presented to the blowpipe has been drawn out until it became fine as a silk fiber, or $\frac{1}{2500}$ of an inch thick, still retaining its character as a tube with a distinct interior and exterior surface. In fact, in theory "great" and "small" are mere terms of relation; under the microscope, objects invisible to the eye appear of considerable bulk; and, as Sir John Herschel, in his celebrated *Introduction to the Study of the Physical Sciences*, has put it, there is no reason why a mote in a sunbeam should not be in itself a world.

DIVORCE, a subject exhaustively treated, in relation to Europe, under the appropriate heading in this ENCYCLOPÆDIA, Vol. VII, pp. 300–305, is of especial interest to Americans, not only by reason of the many and varying laws dealing with this most important social question, but also on account of the more reasonable principles upon which American courts in general have proceeded to dissolve ties which, through misconduct, have become productive of evil to an innocent plaintiff, and thus constituted an evil in the body politic.

The Catholic theory of indissolubility of marriage bonds finds no place in American statute laws, unless it be (and for a far different reason) in South Carolina, which, while legislating as to how large a proportion of his property a married man may leave to his concubine, has steadfastly declined to grant divorces, even for adultery aggravated by the greatest of indignities.

The history of American divorce legislation is interesting, and the tendencies of the various enactments run on well-defined lines. In colonial days, divorces were mainly, if not quite exclusively, granted by acts of the colonial legislatures, and by analogy with the English practice of divorce by act of Parliament. Instances are numerous in early colonial records of the granting of such relief, and until the present day the constitutions of the six New England states, with New York and Delaware, contain no express prohibition of this practice. The causes for which divorce was granted were much the same as in English law; and to the present day, in Georgia, limited divorces are granted "on any ground which was held sufficient in the English courts prior to May 4, 1784."

With the birth of the republic came a change in method. Each separate and sovereign state possessed the power of legislating for itself and its citizens, while the Federal Congress had (and to-day has) legislative jurisdiction over divorces only in the District of Columbia and "in any territory or other place where the United States has exclusive jurisdiction." Thus, and for these reasons, within the boundaries of the United States, may be found nearly half a hundred codes of law, each regulating the granting of divorce within the borders of a state or territory, and occasionally evolving riddles in matrimonial law.

Legislative divorce soon fell into disfavor in the young republic, as savoring of class legislation, and benefiting only the rich. Tennessee was the first to prohibit this method, in a constitution adopted in 1834. Pennsylvania and New Hampshire have ingrafted similar prohibitions upon the state constitutions. Elsewhere the practice is obsolete, or has never been sanctioned by precedent.

As regards the causes for which divorce may be granted, the American colonial legislatures began early to enact statutes more equitable and remedial than obtained in the motherland. The earliest colonists who laid the foundations of New England had brought with them views on divorce common to their reformed brethren in Scotland and Holland. Marriage was no sacrament, and desertion was a sufficient cause for a decree of dissolution. In those days desertion was a very different matter from that which is so called now. Voyages to remote colonies, to the more distant West Indies, or to the far-off motherland, implied long severance of family ties, and to a vagabondic spirit added an extreme probability of adultery. To meet such a case is found a law of the Massachusetts colony, as early as 5 William and Mary (1694), whereby "three years' absence for one gone to sea, the ship not being heard of for three years, when a voyage is usually made in three months," is declared to be sufficient ground for divorce.

The newer states of the Northwest have followed the policy of the first settlers. Causes for divorce have multiplied freely, and have been designed to meet most of the cases of hardship possible. Naturally, in a period of transition from prairie to sovereign state, some abuses have crept in. That parasite of the law—the pettifogger—at times has waxed fat by the exercise of his abilities in obtaining fraudulent divorces and occasionally has conducted a "mail-order business." But settled procedure, bar associations, publicity, and due and proper provisions for the personal service of process, are rapidly rendering "divorce colonies" few and far between.

Decisions of sterling value have gone so far as to hold fraudulent and invalid divorces obtained by concealment and fraud, especially where a plaintiff has proceeded from his own state to one with more lax laws, and for the express purpose of obtaining a divorce, and that without personal service on the defendant, and without the defendant's appearance, in order to give *bona fide* jurisdiction.

In Delaware, Maine and Massachusetts it has been provided by statute that when an inhabitant of the state shall go into any other jurisdiction to obtain a divorce for any cause occurring within the state, or for a cause which would not authorize a divorce by the laws of the state, a divorce so obtained shall be of no force or effect in the state. In all other cases a divorce decreed in any other state or country

according to the laws thereof, by a court having jurisdiction of the case and of the parties, is valid in these states.

In Indiana it is declared, without qualification, that "a divorce decreed in any other state, by a court having jurisdiction thereof, shall have full effect in this state."

The foregoing are the only statutory provisions found on this subject.

Still, the complex and varying nature of the divorce codes of the separate states has produced a well-defined demand for uniformity of laws on this subject. Under the present system it is possible for too many men to have

> "One wife at Natchez-under-the-hill,
> And another at home in Pike."

The sentiment crystallized into action in 1891, when the legislatures of six states appointed commissions of able jurists to confer as to rendering uniform many important laws, including divorce. By 1895 the number of commissions at work was increased to 28. Valuable service has been rendered by these bodies, and their labors are gradually bearing fruit. Their recommendations, in the main, are in the direction of each state adopting a divorce law based upon that of the District of Columbia, and thus to abolish a multiplicity of complex, and at times conflicting, statutes. The alternative of a change in the constitution, giving to Congress the power of passing one uniform divorce law, was considered, but rejected as impracticable.

In many instances intricate questions of law arise on the wording of statutes, and, as a general rule, the subject is one for any interested person to avail himself of the advice of an attorney of standing in the particular state where relief is sought.

The following table, with its appended notes, presents the salient features of the divorce laws of every state and territory, a statement of the causes for which the law's aid may be invoked following immediately after the table:

States and Territories.	Court in which Proceedings Had.	Requirement of Previous Residence.	Specific and Valid Defenses. (See notes below)	Limitation for Bringing Suit.	Right to Re-marry after Divorce.
Alabama	Chancery.	1 to 3 years.	a. b. c. d.	None.	Unless decree.
Alaska	----------	1 year.	b. c. d.	1 year.	6 months.
Arizona	District.	6 months.	a. b. c. d.	4 years.	Yes.
Arkansas	Equity circuit.	1 year.	a. b. d.	5 years.	Yes.
California	Superior.	1 year.	a. b. c. d.	2 years.	Yes.
Colorado	District chancery.	1 year.	a. d.	None.	Yes.
Connecticut	Superior.	3 years.	----------	None.	Yes.
Delaware	Superior.	No law.	a. b. c. d.	None.	Not adulterers.
District of Columbia	Supreme.	2 years.	----------	None.	No law.
Florida	Circuit.	2 years.	a. d.	4 years.	Plaintiff.
Georgia	Superior.	1 year.	a. b. c. d.	None.	Jury permit'g.
Idaho	District.	6 months.	a. c. d.	1 to 2 years.	Yes.
Illinois	Circuit.	1 year.	a. b. d.	5 years.	Yes.
Indiana	Sup'r and circuit.	2 years.	b. c. d.	2 years.	2 years.
Indian Territory	Only tribal laws.	----------	----------	----------	----------
Iowa	District or circuit.	1 year.	----------	None.	Yes.
Kansas	District.	1 year.	d.	5 years.	6 months.
Kentucky	Equity.	1 year.	c.	5 years.	Yes.
Louisiana	District.	No law.	c.	None.	10 months.
Maine	Supreme.	1 year.	a. d.	None.	2 yrs., or leave.
Maryland	Equity.	2 years.	----------	None.	Unless decree.
Massachusetts	Superior.	3 to 5 years.	----------	None.	Def't, 2 yrs.
Michigan	Circuit.	1 to 2 years.	a. b. c. d.	5 years.	Def't, 2 yrs.
Minnesota	District.	1 year.	b. c. d.	3 years.	Yes.
Mississippi	Chancery.	1 to 2 years.	a. c. d.	6 years.	Unless decree.
Missouri	Circuit.	1 year.	a. b. d.	None.	Yes.
Montana	District.	1 year.	a. c. d.	3 years.	Yes.
Nebraska	District.	6 months.	a. b. c. d.	4 years.	6 months.
Nevada	District.	6 months.	c.	4 years.	Yes.
New Hampshire	Supreme.	1 year.	----------	6 years.	Yes.
New Jersey	Chancery.	3 years.	a. b. d.	2 years.	Yes.
New Mexico	District.	6 months.	----------	None.	No law.
New York	Sup'me and sup'r.	1 year.	b. c. d.	5 years.	Not defendant.
North Carolina	Superior.	2 years.	a.	10 years.	Yes.
North Dakota	Circuit.	90 days.	a. b. c. d.	Unreasonable time.	No law.
Ohio	Common pleas.	1 year.	----------	10 years.	No law.
Oklahoma Territory	District.	90 days.	a. b. c. d.	4 years.	6 months.
Oregon	Circuit.	1 year.	b. c. d.	1 year.	6 months.
Pennsylvania	Common pleas.	1 year.	b. c. d.	None.	Adulter'r bar'd
Rhode Island	Supreme.	1 year.	a.	None.	Yes.
South Carolina	No divorce laws.	----------	----------	----------	----------
South Dakota	Circuit.	6 mos. to 1 yr.	a. b. c. d.	Unreasonable time.	No law.
Tennessee	Circuit.	2 years.	b. c. d.	None.	Adulter'r bar'd
Texas	District.	6 months.	a. b. c. d.	4 years.	Yes.
Utah	Circuit.	1 year.	----------	4 years.	No law.
Vermont	County.	1 to 2 years.	----------	None.	3 years.
Virginia	Circuit.	1 year.	b. c.	5 years.	Unless decree.
Washington	Circuit.	1 year.	----------	1 year.	6 months.
West Virginia	Circuit.	1 year.	b. c.	5 years.	Yes.
Wisconsin	Circuit.	1 year.	b. c.	3 years.	Yes.
Wyoming	Circuit.	6 months.	a. b. c. d.	3 years.	Yes.

Specific and Valid Defenses or Bars to Relief. The statutes of a majority of the states provide for the disallowance of applications for divorce where there has been collusion, connivance, condonation, or in case of recrimination.

a. *Collusion* is an agreement between the parties for one of them to commit, or appear to have committed, some act constituting a cause for divorce, in order to enable the other to obtain a divorce.

b. *Connivance* is the corrupt consent of a party to the act of the other constituting a cause for divorce, which is afterward sought to be taken advantage of in an action for divorce.

c. *Condonation* is the conditional forgiveness, either express or implied, by one party, of a breach of matrimonial duty in the other.

d. *Recrimination* arises when the party seeking the divorce is also guilty of the act of which he or she complains in the other, or, in some states, of any other act constituting a ground for divorce.

By reference to the fourth column of the foregoing table, the application of these specific defenses or bars, in each state, can be ascertained.

Causes for Which Divorce is Granted. *Adultery*, the violation of the marriage vow, is sufficient cause for absolute divorce in all the states and territories, except South Carolina, which, as has been stated, is without any divorce laws.

Physical incapacity is a cause in all the states except California, Connecticut, Idaho, Iowa, Louisiana, New Mexico, New York, South Carolina, Texas and Vermont. In most of these states it renders marriage voidable.

Willful desertion, six months in Arizona; one year in Arkansas, California, Colorado, Florida, Idaho, Kansas, Kentucky, Missouri, Montana, Nevada, North Dakota, Oklahoma, Oregon, Utah, South Dakota, Wisconsin, Washington and Wyoming; two years in Alabama, District of Columbia, Illinois, Indiana, Iowa, Michigan, Mississippi, Nebraska, New Jersey, Pennsylvania and Tennessee; three years in Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, Ohio, Texas, Vermont and West Virginia; five years in Louisiana, Virginia and Rhode Island, though the court may, in the latter state, decree a divorce for a shorter period. Both parties living apart without cohabitation, five years in Kentucky; ten years, Rhode Island.

Habitual drunkenness, in all the states and territories, except Illinois, Maryland, New Jersey, New York, Pennsylvania, South Carolina, South Dakota, Texas, Vermont and Virginia.

Imprisonment for felony or *conviction of felony*, in all the states and territories (with limitations), except Florida, Maryland, New Jersey, New Mexico, New York and South Carolina.

Cruel and abusive treatment, *intolerable cruelty*, *extreme cruelty*, *repeated cruelty* or *inhuman treatment*, in all the states, except Maryland, Michigan, New York, South Carolina, Tennessee, Virginia and West Virginia.

Failure by the husband to provide, six months in Arizona; one year in California, Colorado, Idaho, Nevada and Wyoming; two years in Indiana; three years in Delaware; no time specified in Arizona, Maine, Massachusetts, Michigan, Nebraska, New Mexico, Rhode Island, Utah, Vermont, Washington and Wisconsin.

Fraud and fraudulent contract, in Connecticut, Delaware, Georgia, Kansas, Kentucky, Ohio, Pennsylvania, Vermont and Washington.

Absence without being heard from, three years in New Hampshire and Ohio; seven years in Connecticut and Vermont; *voluntary separation*, five years in Wisconsin; *when reasonably presumed dead by the court*, in Rhode Island.

Ungovernable temper, in Kentucky; *habitual indulgence in violent and ungovernable temper*, in Florida; *cruel treatment, outrages or excesses as to render their living together insupportable*, in Arkansas, Kentucky, Louisiana, Missouri, Tennessee and Texas; *indignities as render life burdensome*, in Missouri, Oregon, Pennsylvania, Tennessee, Washington and Wyoming. *Attempt to murder the other party*, in Illinois, Louisiana and Tennessee.

Insanity or idiocy at time of marriage, in Arkansas, Colorado, District of Columbia, Georgia, Iowa and Mississippi; *insanity lasting ten years*, in Washington.

Other causes in different states are as follows: *Husband notoriously immoral before marriage, unknown to wife*, in West Virginia; *fugitive from justice*, in Virginia; *gross misbehavior or wickedness*, in Rhode Island; *any gross neglect of duty*, in Kansas and Ohio; *refusal of wife to remove into the state*, in Tennessee; *mental incapacity at time of marriage*, in Georgia; *three years with any religious society that believes the marriage relation unlawful*, in Massachusetts; *joining any religious sect that believes marriage unlawful, and refusing to cohabit six months*, in New Hampshire; *parties cannot live in peace and union*, in Utah; *vagrancy of the husband*, in Missouri and Wyoming; *refusal of wife to cohabit for twelve months*, in North Carolina; *excesses*, in Texas; *where wife, by cruel and barbarous treatment, renders condition of husband intolerable*, in Pennsylvania.

In Georgia, an absolute divorce is granted only after the concurrent verdict of two juries, at different terms of the court. In New York, absolute divorce is granted for but one cause, adultery. In South Carolina there are no divorce laws.

In many states a limited divorce may be granted for any of the causes for which an absolute decree may be given. This decree may be limited as to time, and in operation resembles the judicial separation granted by the English courts. The decree does not enable either party to marry any other person, as the original marriage remains undissolved.

The literature on the question of divorce is more than voluminous. Bishop's learned *Commentaries on the Law of Marriage and Divorce* (2 vols., 1891) and Nelson's *Divorce and Separation* (2 vols., 1895) must be placed in the front rank of American legal textbooks. The masterly report of the Commissioner of Labor, Carroll D. Wright, is interesting as a popular and accurate compilation of laws, and a most valuable collection of statistics. Among other works may be mentioned *Divorce and Divorce Legislation*, by Theodore D. Woolsey (1882); *A Digest of Divorce and Alimony*, by W. H. Browne (1872); *A Treatise on the Law of Divorce*, by A. P. Lloyd (1887); and *The Law of Marriage and the Family Relations*, by Neville Geary (1892). Polemically, the question has been treated by a host of social scientists, and from every possible point of view. Much valuable information can be gleaned from the annual reports of the National Divorce Reform League, the corresponding secretary of which organization, the Rev. Samuel W. Dike, LL.D., has labored long, and with marked literary as well as executive ability, in the interests of wholesome and uniform legislation on this greatest of social questions.

DIX, Dorothea Lynde, an American philanthropist; born in Worcester, Massachusetts, in 1794; died in Trenton, New Jersey, July 19, 1887. She taught school in Boston, Massachusetts, until 1834, when she visited Europe. In 1837 she returned to Boston, and devoted herself to investigating the condition of paupers, lunatics and prisoners, visiting every state of the Union east of the Rockies, endeavoring to influence legislation in favor of the poor and the unfortunate. During the Civil War she was superintendent of hospital nurses. She wrote a number of books, among which are *Conversations About Common Things*, a book for children, and *Prison and Prison Discipline* (1845).

DIX, John Adams, an American statesman and soldier; born in Boscawen, New Hampshire, July 24, 1798;

died in New York City, April 21, 1879. He was educated at the College of the Sulpicians, Montreal, and at St. Mary's College, Baltimore; entered the army in 1812; in March, 1814, became third lieutenant in the Twenty-first Infantry; was made first lieutenant in 1816; aide-de-camp to General Brown in 1819; and captain in 1825. In 1826 he resigned his commission, studied law, and was admitted to the bar in 1828. Mr. Dix was appointed secretary of state for New York in 1833; was elected to the state assembly in 1842; and United States Senate in 1845; was assistant treasurer of the United States in 1853; postmaster of New York in 1859; and Secretary of the Treasury in Buchanan's Cabinet in 1861. At the beginning of the Civil War he entered the army and was immediately appointed brigadier-general and major-general of volunteers. After holding charge of the department of Maryland, he was sent to Fortress Monroe, in command of the Seventh Army Corps. In 1863 he was ordered to New York, where, in 1864–65, he aided in suppressing the riots caused by President Lincoln's order for the draft of troops. In 1866 General Dix was appointed naval officer of the port of New York, and in the same year minister to France; in 1872 was elected governor of New York. He interested himself in schemes for general education, commercial law, and in the exposure of city frauds. He edited a literary journal, *The Northern Light;* published various translations, including two of the hymn *Dies Iræ;* and was the author of *Speeches and Addresses; Winter in Madeira;* and *A Summer in Spain and Florence.* He was an active member of Trinity Church, New York, of which his son, the Rev. Morgan Dix, became rector in 1852. See his *Biography*, by the Rev. Morgan Dix (New York, 1883).

DIX, Morgan, an American Episcopal clergyman, son of John A. Dix; born in New York, Nov. 1, 1827; graduated at Columbia College (1848), and at the General Theological Seminary (1852); ordained priest (1853); became assistant minister of Trinity parish, New York (1855), and rector of that parish (1862). An able and conservative exponent of high Anglican doctrines, he cared more for their theological bearing than for ritualistic forms, and as a preacher was distinguished for the solidity of his attainments, for his clearness of utterance and thought, and for his courage. Under his administration, Trinity parish largely increased its usefulness, through the establishment of chapels throughout the city, some of them exceedingly handsome and prosperous. An *Essay on Christian Art* (1853); *Lectures on the Two Estates, that of Wedded in the Lord and that of Single for the Kingdom of Heaven* (1872); *Lectures on the Prayer Book of King Edward VI* (1881); *The Gospel and Philosophy* (1886); and *The Sacramental System* (1893), are among his published writings.

REV. MORGAN DIX.

DIX ISLAND, an island 10 miles S. by E. of Rockland, Maine. It consists of 55 acres of the best granite. A large number of men employed in the quarry live on the island. From this place was obtained the building-stone used in constructing the Treasury Building at Washington, and the Post-Office and Courthouse in New York City.

DIXON, a village of Solano County, central western California, 20 miles S.W. of Sacramento, on the Southern Pacific railroad. The town has granaries and flour-mills, and exports wheat, barley, hay, cattle, wool, wine and pork, the products of the neighborhood. Population 1890, 1,082.

DIXON, the capital of Lee County, central northern Illinois, on the Illinois Central and the Chicago and Northwestern railways, 90 miles W. of Chicago. It lies on both banks of the Rock River, which furnishes power for flour and planing mills, agricultural implement works, foundries, sash, door and spring-bed factories, milk-condensing and shoe factories and other industries. Dixon has a normal school, a public school building costing $30,000, and is the seat of the Northern Illinois College and the Rock River University. Population 1890, 5,161.

DIXON, James, an American public man; born at Enfield, Connecticut, Aug. 5, 1814; died at Hartford, March 27, 1873. He began the practice of law in 1836, and was a member of the Connecticut legislature in 1837 and 1838, and again in 1844, being the leader of the Whig party in that state. From 1845 to 1849 he was a member of the United States House of Representatives, and from 1850 to 1857 was in the state senate. In 1857 he became a United States Senator, continuing in this capacity until 1869, when he withdrew and traveled in Europe. Senator Dixon was noted for his eloquence and for his activity in promoting legislation favorable to the manufacturing interests. He was a writer of poems and sonnets and a frequent contributor to periodical literature.

DIXON, James Main, a Scottish-American educator; born at Paisley, Scotland, April 20, 1856; was distinguished for his attainments in philosophy at St. Andrew's University, and when quite a young man was called to a professorship in the Imperial College, at Tokyo, Japan, remaining there for 26 years. In 1892 he was appointed to the chair of English literature in Washington College, St. Louis, Missouri. He was the author of several learned publications, among them a *Dictionary of Idiomatic English Phrases* (1890).

DIXON, Joseph, an American inventor; born in Marblehead, Massachusetts, Jan. 18, 1799; died in Jersey City, New Jersey, June 17, 1869. His first invention was a machine for cutting files, developed before he was 21 years old, and he was the first person to take portraits with the camera. He built the first locomotive with the double crank; he made extensive and most important inventions in lithography, originating the process of transferring on stone, and inventing the process of photo-lithography. He became most widely known as the inventor of plumbago or graphite crucibles, and the founder of the graphite manufacturing plant at Jersey City that bears his name.

DIXON, William Hepworth, an English jour-

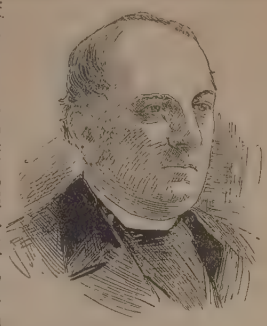
nalist and author; born in Yorkshire, England, June 30, 1821; died in London, Dec. 27, 1879. He contributed to London newspapers and magazines, and edited the *Athenæum* from 1853 to 1869. He also wrote lives of Lord Bacon, John Howard, William Penn and Admiral Blake, and published *New America; New Russia; Spiritual Wives; Her Majesty's Tower; Free Russia;* and other works of like character.

DIXON, WILLIAM W., an American lawyer and public man; born in Brooklyn, New York, June 3, 1838. He removed with his family to Quincy, Illinois, in 1842, and to Keokuk, Iowa, in 1849; received a common-school education, and entered the profession of law in Keokuk; went to Tennessee and Arkansas in 1860, and in 1862 crossed the plains to California; went to Nevada the same year, and to Montana in 1866. In 1879 he went to the Black Hills, remaining two years, and then settled in Butte City, Montana. In politics a Democrat, he was elected a member of the Montana legislature in 1871; was a member of the Montana constitutional conventions of 1884 and 1889, and in 1890 was elected a representative at large from Montana to the Fifty-second Congress.

DIXON'S ENTRANCE, a strait 100 miles long from east to west, on the southern coast of Alaska, between lat. 54° and 55° N. and long. 131° and 133° W. It divides Queen Charlotte Island on the south from the Prince of Wales Archipelago on the north.

DJEZZAR ("butcher"), the name given, on account of his cruelty, to Achmed Pasha, famous for his obstinate defense of Acre against Napoleon I. He was born in Bosnia about 1735, and died at Acre in 1804. Having fled his native country because of a crime, he was sold into slavery in Egypt and became his master's assassin. He finally fled to Syria, and, attracting the attention of the sultan, was made pasha of Acre, with instructions to crush out the independence of the Druses, a work which he accomplished with infamous cruelty.

DOANE, GEORGE WASHINGTON, an American churchman; born in Trenton, New Jersey, May 27, 1799; died in Burlington, New Jersey, April 27, 1859. After graduating at Union College in 1818, he studied law and afterward theology. Bishop Hobart ordained him deacon in 1821, and he became assistant minister in Trinity Church, New York. He was chosen professor of rhetoric and belles-lettres at Trinity College (then Washington), when it was founded in 1824. He went in 1828 as assistant minister to Trinity Church, in Boston, and became rector there in 1830. In October, 1832, he was consecrated bishop of New Jersey, and was rector of St. Mary's Church. He established a school for young ladies in Burlington (1837), called St. Mary's Hall, and he also established Burlington College in 1840. He went to Europe in 1841, and was the first American bishop to preach in England. A volume of his sermons was published in London the next year. He published, in 1824, *Songs by the Way, Chiefly Devotional, with Translations and Imitations.* His life, his poetical works, sermons and miscellaneous writings (5 vols., 1860) were published by his son, WILLIAM CROSWELL DOANE, who was born in Boston, March 2, 1832; ordained deacon in 1853 and priest in 1856; rector of St. Barnabas Free Church in Burlington; of St. John's Church, Hartford, Connecticut, in 1863–67, and then at St. Peter's Church, Albany. He was consecrated bishop of the new diocese of Albany in 1869; founded, in Albany, the Cathedral of All Saints, the Sisterhood of the Holy Child Jesus, St. Agnes School, and the Child's Hospital. He has written much on religious topics.



BISHOP DOANE.

DOBBS, ARTHUR (1684–1765), an American colonial governor. He was governor of North Carolina from 1754 to 1765. He wrote *Trade and Improvement of Ireland; Captain Middleton's Defense;* and *An Account of the Countries Adjoining to Hudson's Bay.*

DOBBS FERRY, a summer resort on the Hudson River, in Westchester County, New York, and on the New York Central and Hudson River railroad, 20 miles N. of New York City. It contains remains of military works built about 1776. Population 1890, 2,083.

DÖBEREINER, JOHANN WOLFGANG, a German chemist; born at Hof, Bavaria, Dec. 15, 1780; died at Jena, March 24, 1849. He was professor for forty years at the University of Jena, and was the author of *Principles of General Chemistry*, which reached a third edition in 1826. He gained wide celebrity by his discovery of the combustibility of platinum, and by the invention of the Döbereiner lamp. See MATCHES, Vol. XV, p. 625.

DOBSON, HENRY AUSTIN, an English litterateur and writer of *vers de société* and lyrical *elegantiæ*; born in Plymouth, England, Jan. 18, 1840, the son of George C. Dobson, a civil engineer. After an education, received partly in England and partly in Germany, with the view of following his father's profession, he was appointed, at the age of 16, to a civil service clerkship in the London Board of Trade. His bent, however, drew him to literature, and he became a frequent contributor in prose and verse to English periodicals. His temperament and tastes early disposed him to the manufacture of the graceful and light forms of drawing-room verse, including adaptations of the French rondeau, ballade and villanelle. In this *rôle* he at once became the pioneer of a new movement in English poetry, associated with the names of Frederick Locker, C. S. Calverley and Mackworth Praed, to revive the dainty, debonair verse of Suckling, Prior and other early fashionable poets and courtly troubadours. In 1873 he collected his scattered lyrics into a volume, entitled *Vignettes in Rhyme and Vers de Société*, which was followed, four years later, by *Proverbs in Porcelain.* These, in turn, were followed by *Old World Idyls* (1883) and *At the Sign of the Lyre* (1885). Prose composition now for a time occupied his pen. To Humphry Ward's *English Poets* he wrote the introductions on

Prior, Gay, Praed, Hood; to Morley's English men of Letters he contributed a *Life of Fielding;* to the Great Writers Series, a *Life of Goldsmith;* to the English Worthies Series, a *Life of Steele;* to the *Biographies of Great Artists*, a *Life of Hogarth;* and to the Parchment Library an edited collection of *Eighteenth-Century Essays.* Besides these works, Mr. Dobson published, in 1884, *Thomas Bewick and His Pupils;* in 1890, a *Memoir of Horace Walpole;* in 1891 a further volume of essays, entitled *Four Frenchwomen;* and in 1892 and 1894, two series of, *Eighteenth-Century Vignettes.* He was also a contributor to the Temple Library, the Chiswick Press Reprints, the Ex-Libris Series, and edited a number of English and French classics for the Clarendon Press. For the Cranford Series he edited, in 1894, a collection of *Old English Songs*, with introduction and notes.

DOD, Albert Baldwin (1805–45), an American educator. He taught from 1822 to 1826 in Fredericksburg, Virginia, when he entered the Princeton Theological Seminary, and was licensed to preach in 1829. From 1830 till his death he was professor of mathematics in Princeton College. One of the most beautiful dormitories on the campus was erected in 1890 as a memorial of him.

DOD, Thaddeus, an American Presbyterian minister, was born near Newark, New Jersey, March 7, 1740; died in Cross Creek, Pennsylvania, May 20, 1793. He was licensed to preach in 1775. He preached at first in Virginia, and then in Pennsylvania. He founded a classical and mathematical school in 1782, and was a teacher in it until 1787. He was one of the founders and the first president of Washington College, Pennsylvania, and founded the first presbytery west of the Alleghany Mountains.

DODD, Edward Mills, an American missionary to Smyrna; born in Bloomfield, New Jersey, June 22, 1824; died in Marsovan, Turkey, in 1865. He became a Presbyterian minister in 1848, and sailed for Smyrna in 1849, representing the American board on a mission to the Jews at Salonica. After three years he returned to the United States, but again sailed for Smyrna, and from 1855 continued his labors among the Armenians. In 1863 he was transferred to Marsovan, where he remained until his death.

DODDER-LAURELS, a common name given to species of *Cassytha*, a genus of *Lauraceæ*, or "laurels," although sometimes considered a separate family (*Cassythaceæ*). They are dodder-like, herbaceous, slightly green, almost leafless, twining parasites, natives of the tropics, but one Florida species belonging to the United States.

DODDS, Alfred Amédée, a French mulatto general, famous for long and successful service in Africa; born at St. Louis, Senegal, Feb. 6, 1842; entered the army in 1864; served in the Réunion campaign in 1869, in the campaigns of Sedan, the Loire and the East in 1870, and in Senegal from 1872 to 1892. In the latter year he led a victorious expedition against the king of Dahomey, and was promoted grand officer of the Legion of Honor.

DODECATHEON, an American genus of *Primulaceæ*, or "primroses," whose species occur from the western slopes of the Alleghanies to the Pacific. It is characterized by its cluster of smooth leaves at the base of the stem, which bears an umbel-like cluster of beautiful flowers, the calyx being reflexed, the long white to purple petals also sharply reflexed, and the linear anthers conniving into a long, slender projecting cone, giving the flower a Cyclamen-like look. The common species of the eastern Mississippi basin is *D. Meadia*, often called "shooting-star" or "American cowslip."

DODGE, Augustus Cæsar, an American soldier and public man; born in Missouri, Jan. 2, 1812; died in Burlington, Iowa, Nov. 20, 1883. He served in the Winnebago war of 1827, and the Black Hawk war of 1830; was registrar of the land-office at Burlington, Iowa (1838–39); delegate to Congress (1840–47); United States Senator (1848–55); and minister to Spain (1855–59).

DODGE, Grenville Mellen, an American soldier; born at Danvers, Massachusetts, April 12, 1831. He was engaged in railroad surveys until 1854; in 1861 he joined the army and distinguished himself on many occasions. He commanded a brigade at Pea Ridge, March 31, 1862, and was made major-general of volunteers in 1864 for his services at Sugar Valley, May 9, 1864, and Resaca, May 14th and 15th. He commanded a corps in the Georgia campaign of Sherman, and made a gallant stand at Atlanta, August 19th, being severely wounded and incapacitated for active service. In December, 1864, he succeeded General Rosecrans in the command of the department of the Missouri. He resigned from the army in 1866, became chief engineer of the Union Pacific railroad, and has since been constantly employed in building railroads in the various states. He was a member of Congress from 1867 to 1869.

DODGE, Henry, an American soldier; born at Vincennes, Indiana, Oct. 12, 1782. He served in the United States army from 1812 to 1836 and fought in the Black Hawk war and other affairs, and was incomparable as an Indian fighter. He became governor of Wisconsin territory in 1836 and superintendent of Indian affairs. From 1841 he was a delegate to Congress for two terms. In 1846 he again became governor of Wisconsin, and after the admission of that state to the Union was made one of its first United States Senators, serving from 1848 to 1857. He died at Burlington, Iowa, June 12, 1867.

MARY ABIGAIL DODGE.

DODGE, Mary Abigail, an American authoress, better known as "Gail Hamilton," was born at Hamilton, Massachusetts, in April, 1833. She was for several years from 1851 instructor in physical science in the Hartford, Connecticut, high school, and afterward a governess in the family of Dr. Gamaliel Bailey, Washington, who was editor of the *National*

Era, to which Miss Dodge became a contributor. For two years from 1865 she was one of the editors of *Our Young Folks*. Among her numerous works are *Country Living and Country Thinking* (1862); *Gala-Days* (1863); *A New Atmosphere* (1864); *Skirmishes and Sketches* (1865); *Woman's Wrongs: A Counter-Irritant* (1868); *Woman's Worth and Worthlessness* (1871); *Twelve Miles from a Lemon*, sketches (1874); *The Insuppressible Book* (1885); and *English Kings in a Nutshell* (1893). Her mother was Hannah Stanwood, of Hallowell, Maine, a brother of whom, Jacob Stanwood, was the father of Mrs. James G. Blaine. Miss Dodge thus became intimate with the Blaine family and was appointed literary executor of Mr. Blaine. She was engaged assiduously upon the biography of the great statesman, and it was thought that her devotion to this work hastened her end, which occurred at Hamilton, Aug. 17, 1896.

DODGE, Mary Mapes, an American authoress; born at New York City in 1838. Early in life she was left a widow, with two sons to support. She took up literature, and for a number of years was one of the editors of *Hearth and Home*. When, in 1873, *St. Nicholas* was started, it was placed in charge of Mrs. Dodge, and under her direction it met with great success. In addition to her editorial labors, she contributed to periodicals, and published *Rhymes and Jingles* (1874); *Theophilus and Others* (1876); *Along the Way*, poems (1879); *Donald and Dorothy* (1883); *The Land of Pluck* (1894); *When Life is Young* (1894). An amusing sketch by her, called *Miss Malony on the Chinese Question*, which appeared in *Scribner's Monthly* in 1870, attracted many readers at the time and is still read with pleasure and advantage.

MARY MAPES DODGE.

DODGE, William Earle, an American philanthropist; born at Hartford, Connecticut, Sept. 4, 1805. He went into business in New York City in 1826 as a manufacturer and importer. He later took a great interest in all benevolent and religious institutions, and was a member of the Peace Convention of 1861. He contributed most of the funds toward the establishment of the Protestant college at Beyrout, Syria. He sat in Congress as a Republican from 1866 to 1867. Died at New York City, Feb. 9, 1883. Two years after his death a statue to his memory was erected in his adopted city.

DODGE CITY, the capital of Ford County, southwestern Kansas, on the Arkansas River, 302 miles S.W. of Topeka, on the Atchison, Topeka and Santa Fé railroad. It has a Presbyterian college, water-works and electric lights. Population 1895, 1,857.

DODGEVILLE, a city and the capital of Iowa County, southwestern Wisconsin, 48 miles W.S.W. of Madison; situated on the Chicago and North-Western and Illinois Central railroads, in a region which produces lead and copper; manufactures wagons, plows, flour, butter, and cheese. Pop. 1890, 1,722.

DODGSON, Charles Lutwidge, an English author; born in 1832; graduated at Christ Church, Oxford, in 1854, with high honors in mathematics; was mathematical lecturer there in 1855–81; and was ordained to the ministry in 1861. He was the author of a large number of valuable works in mathematics; among them, *Euclid and His Modern Rivals* (1879); *Mathematica Curiosa* (1888–93), characterized as a valuable contribution to the science; also *Symbolic Logic* (1896). Under the pseudonym, "Lewis Carroll," he produced many quaint books, which, for children, are unrivaled, including *Alice's Adventures in Wonderland*, with illustrations by Sir John Tenniel (1865); *Phantasmagoria, and Other Poems* (1869); *Through the Looking-Glass, and What Alice Found There* (1871); *The Hunting of the Snark* (1876); *Doublets: A Word Puzzle* (1879); *Rhyme? and Reason?* (1883); *A Tangled Tale* (1885); *Alice's Adventures Underground: A Fac-Simile of the Original Manuscript*, with 37 illustrations by the author (1886). *Through the Looking-Glass*, which is a continuation of *Alice's Adventures*, is established as an English nursery classic, and has been translated into nearly every language in Europe. Died in Guilford, Jan. 14, 1898.

DOG–DAYS, anciently, the forty days between July 3d and August 11th, the term being derived from Sirius, the dog-star, which was supposed to cause the insufferable heat at this season. The dog-days of the Egyptians extended from the 4th of August to the 14th of September. The rising of Sirius, however, has been so accelerated by the precession of the equinoxes during the passage of more than two thousand years that the corresponding conditions for the ancient dog-days would not include them within the 3d of July and the 11th of August, so that our modern dog-days have no connection with the rising of Sirius or any other star.

DOG DISTEMPER. See Veterinary Science, Vol. XXIV, p. 205.

DOG–FOX, a small animal of the genus *Cynalopex*, family *Canidæ*, found in Asia.

DOGGERBANK. See North Sea, Vol. XVII, p. 563.

DOGGETT, David Seth, an American bishop of the Methodist Episcopal Church; born in Lancaster County, Virginia, Jan. 23, 1810. He became an itinerant Methodist preacher at the age of 19, and from 1840 to 1846 was professor in Randolph-Macon College, Virginia. From 1850 to 1856 he was editor of the *Southern Methodist Quarterly Review*, and in 1865 founded, in connection with Dr. John E. Edwards, the *Episcopal Methodist*. He was a member of the conference of 1844, when the Southern conferences separated from those of the North, being a leader on the Southern side. In 1866 he became a bishop of the Methodist Episcopal Church South, and held that office until his death, which occurred at Richmond, Virginia, Oct. 27, 1880. He published *The War and Its Close* (1864).

DOG ISLAND, an island in Franklin County, southwestern Florida, four miles from shore. St. George's Sound is between it and the mainland. It

is six miles long and quite narrow. A lighthouse stands on the island, a mile from its western end, at lat. 29° 46′ 51″ N., long., 84° 38′ 37″ W., with a revolving light.

DOGMA, originally an opinion or proposition put in the form of a positive assertion, its truth being supposed to have been previously shown. In theology it was understood to signify a doctrine founded on Scripture, and advanced, not for discussion, but for belief. But as this method of stating truth easily degenerates into the assertion of opinions without ground, and without regard to the aspect they may present to others, *dogma* and *dogmatism* have come, in English, to be almost synonymous with assertion without proof. In Continental theology, however, the word is still used without implying any censure, dogmas meaning simply doctrines; and this is the case in our own expressions, *dogmatic theology*, or *dogmatics*, which is that branch of theology that treats of the systematic arrangement of the doctrines of Christianity. See DOGMATIC, Vol. VII, p. 332.

DOGS. For a full, general discussion of this subject, see Vol. VII, pp. 324–331. The annual exhibitions which, during the last few years, have been held at New York, Chicago, Boston and other American cities, under the auspices of the Westminster Kennel Club, have fostered an increasing love for and knowledge of dogs, and have resulted in great improvement in the various breeds of this most companionable and affectionate type of all the brute creation. Competition in the champion and open classes has grown more and more spirited, and interest in these annual exhibitions has spread, until now, polite society having put the stamp of its approval upon it, the "dog show" has become admittedly one of the fashionable happenings of the season. At the annual exhibitions held under the auspices of the Westminster Kennel Club, in the cities named, dogs of every breed and clime are to be seen.

Corps of trained dogs are attached to the different European armies, which are to be used not only as guards for outpost work, but also to carry dispatches and ammunition.

By the statutory regulations of most of the states, a dog is personal property; the owner may be indemnified in case of willful injury to the dog, and theft of the animal is a crime. Some states require, however, that the dog shall be licensed, or registered and collared, and therefore subject to taxation, before any property rights can attach to the animal. Unless duly authorized by law to kill unlicensed dogs, no one has a legal right to kill a dog belonging to another, unless he, or some one under his protection, or his animal, is in immediate danger of injury from the dog, or the dog is rabid, or has been bitten by a rabid animal. In general, the owner is liable in damages for any injuries caused by his dog; and he cannot plead ignorance of the vicious habits of the animal in mitigation of the damages, every owner being bound to know the character of the dog he keeps. The owner of a vicious and dangerous dog may be indicted for keeping a nuisance, and be compelled to muzzle or kill the animal. Dog-racing is not illegal when for training purposes only, but if chance is the principal element, it becomes a crime within the statutes against gaming.

Boards of health, or other civic authorities generally throughout the United States, issue edicts requiring all dogs to be kept muzzled for a certain number of weeks during the summer season, and authorizing any person to kill any dog found running at large not so muzzled. In many cities the police make raids on ownerless dogs and destroy them. Some American cities have homes for lost dogs, modeled after that at Battersea, London.

DOGSBANE, the common name of a small genus (*Apocynum*) of the family *Apocynaceæ*, perennial herbs or under-shrubs. The dogsbane of North America (*A. androsæmifolium*), often called "fly-trap," from the throat appendages of its corolla closing upon the insects which enter it, is of medicinal repute; similarly, also, its congener, *A. cannabinum*, or Indian hemp.

DOG'S-TAIL GRASS, a common name applied to *Eleusine Indica*, an Oriental grass introduced into the United States for lawns, and used in the South as a pasture-grass. It is also known as "crab-grass," "yard-grass" and "wire-grass." The name is also applied, in England, to another lawn and pasture grass, *Cynosurus cristatus*.

DOHRN, ANTON, a German zoölogist; born at Stettin, Prussia, Dec. 29, 1840; studied at Königsberg, Bonn, Jena and Berlin. He lectured for a time at Jena on zoölogy, and, after studying the crustaceans of the British coast and the Mediterranean, he founded the famous zoölogical laboratory at Naples in 1870, which, by his assiduity, has drawn investigators from nearly every country where science is prosecuted. In embryology he is noted for his researches into the development of insects, and also on the origin of vertebrates. His views can be gathered by referring to the article on VERTEBRATA, Vol. XXIV, p. 183; and ZOÖLOGY, Vol. XXIV, p. 822, of this ENCYCLOPÆDIA. He has published *Der Ursprung der Wirbelthiere* (1875); and *Studien zur Urgeschichte des Wirbelthierkörpers* (1882).

DOILY OR DOILEY, a small napkin used at a table for putting glasses upon during dessert. Some are highly ornamented. The name is said to be derived from the original maker, but more probably it is a modification of the Dutch *dwaele*, a towel, and was introduced with the article from Holland.

DOIT, a small copper coin current in Scotland during the reigns of the Stuarts. It was a Dutch coin (*duit*), and in value the sixteenth part of a guilder.

DOKMEH, DAKHMA OR TOWER OF SILENCE, a receptacle for the dead used by the Parsees, consisting of a low stone tower, on top of which the bodies are exposed to the vultures till, being denuded of their flesh, their bones drop through the grating into a pit beneath. See PARSIS, Vol. XVIII, p. 326.

DOLABRA, a rude ancient hatchet. *Dolabræ* are represented on the columns of Trajan and Antoninus, and abound in all museums. When made of flint, which was their earliest and rudest form, they are usually called *celts*.

DOLABRIFORM, having the shape of an ax or hatchet, as some leaves, and also certain organs of some shell-fish.

DOLBEAR, Amos Emerson, an American physicist; born at Norwich, Connecticut, Nov. 10, 1837. In 1866–67 he was instructor of chemistry at the University of Michigan, from which he received the degree of Ph.D. in 1883, and in 1867–68 assistant professor of natural sciences in the University of Kentucky. From 1868 to 1874 he was professor in Bethany College, West Virginia, and then became professor of physics and astronomy in Tufts College, College Hill, Massachusetts. He invented the electric gyroscope in 1867, used to demonstrate the rotation of the earth; tuning-forks to exhibit Lissajou's curves in 1872; the opeidoscope, to exhibit vocal vibrations; in 1876 the magneto-electric telephone; and in 1879 the static telephone. He published *The Art of Projecting* (1877–88); *The Telephone, with Directions for Making a Speaking-Telephone* (1877); *Sound and Its Phenomena* (1885).

DOLE, Sanford Ballard, President of the Republic of Hawaii; born at Honolulu in 1844, the son of an American missionary from Maine. After studying at Pubahan College, the son went to the United States and studied at Williams College in 1866. He was admitted to the bar in Boston, and returned to Honolulu and practiced law from 1870 to 1887, becoming afterward a judge of the supreme court. On the overthrow of the Hawaiian monarchy in 1893, he was chosen provisional president, and was confirmed chief executive of the island on the proclamation of the republic, July, 4, 1894, his term of office being for six years.

DOLFS AT FUNERALS are of great antiquity. St. Chrysostom speaks of them as being given to procure rest to the soul of the deceased. On this ground, as well as on the score of general benevolence, the practice of making gifts to the poor at funerals was common until comparatively recent times, for it was continued, sometimes on a munificent scale, long after the custom of praying for the dead had been abandoned in some localities on the introduction of reformed doctrines. For a curious instance see Tichborne, in these Supplements.

DOLGORUKI, the family name of one of the most powerful ruling houses in Russia, that became connected with the present dynasty by the marriage, in 1624, of Maria Dolgoruki to the Czar Michael. During the reign of Peter the Great, Yakov Federovitch Dolgoruki (born in 1639) was chief of the first regular embassy sent to France and Spain in 1687, and distinguished himself in the Turkish campaign of 1696 and 1697, obtaining the rank of general. He was taken prisoner at Narva by the Swedes and detained for ten years. On his return to Russia, after his release, he was made a Senator, and died in 1720. —Vasili Vladimirovitch Dolgoruki, born in 1667, was ambassador to France under Peter the Great; was exiled in 1718 on account of suspected disloyalty, but was recalled by Catherine I in 1726, who appointed him general-in-chief, and put him in command of an expedition against Persia. He was made a field-marshal by Peter II, and in 1739 was imprisoned upon a slight charge, but was restored in 1741 to his full dignities, and died in 1746. His nephew, Vasili, was sent to conquer the Crimea, which he did easily in 1771, his conquest resulting in the annexation of the territory to Russia in 1783. —Peter Vladimirovitch, born at Moscow, in 1807; an author; was banished on the publication of his work, *The Truth About Russia*, in 1860. He was also the author of *France During the Bonapartist Régime* (1864); *The Question of the Serfs in Russia* (1861); *The Russo-Polish Question* (1861). His *Memoirs*, in two volumes, were published after his death, which occurred at Geneva, Aug. 17, 1868.

DOLGORUKI, Katharina Michailowna, Princess Jurjeffskaya, married, morganatically, July 31, 1880, to Alexander II, czar of Russia, on the death of his wife, Marie, Princess of Hesse. After the assassination of the czar, Princess Dolgoruki retired to Switzerland, and, under the pseudonym of "Victor Laférté," published *Alexandre II: Détails Inédits sur sa Vie Intime et sa Mort* (1882).

DOLICHOCEPHALIC. See Anthropology, Vol. II, p. 111.

DOLICHOS, a genus of leguminous plants with long pods which are used in the East and West Indies for food. Chinese "soy" is made from *D. soya*. *D. Lablab*, the "Egyptian" or "black bean" of India, is cultivated mostly for ornament. It bears elongated racemes of showy violet, purple or white flowers, and its seeds are black, with a white scar. *D. Sinensis*, the "China bean" or "Black-eyed bean," has but two or three pale flowers, and white seeds with a black circle around the scar.

DOLIUM, a genus of gasteropod mollusks. They are common in the warm seas of the eastern hemisphere, and many are fossils in Tertiary formations. The shell is marked by deep furrows spirally arranged.

DOLL, an image, usually representing a little girl, but sometimes a boy or man, and used as a toy. The word *doll* is of doubtful derivation; various etymologies have been suggested. The use of dolls dates from the most remote times, and is common in all countries, barbarous as well as civilized. The love of dolls is a perfectly legitimate feeling, and its exercise helps to cultivate not only tender affections, but also taste as regards the making and management of children's dresses. Accordingly, the keeping of dolls becomes a part of the home education of girls, and is recognized to be so by the universality of the practice. Dolls at one time were imported chiefly from the Netherlands, and hence not an unusual name for a doll was "Flanders baby." These old Flemish or Dutch dolls were made of wood, with neatly formed faces and flashy dresses, the cheaper kinds having slender wooden legs. Latterly, there have been great improvements in the making of dolls, and it has assumed the character of a manufacture; but there are still large importations from the countries on the Rhine, France and Switzerland. The discovery and perfection of the phonograph marks a new era in the manufacture of these toys, and talking dolls are now almost as common as the ordinary wax dolls were a few years ago.

DOLLAR-BIRD (*Eurystomus*), a bird belonging

to the rollers (*Coraciadæ*), living in the Australian region. It is of a bright blue color, with a round, white mark on the wing, which, from some fancied resemblance, suggested the name.

DOLLART ZEE, a gulf of the North Sea between the Netherlands and Germany; it is ten miles long and seven broad, and receives the waters of the Ems River. It was formed in 1257 by inundations. See NORTH SEA, Vol. XVII, p. 563.

DÖLLINGER, JOHANN JOSEPH IGNAZ VON, a German theologian; born at Bamberg, Bavaria, Feb. 28, 1799. He was the son of Ignatz Döllinger, the celebrated anatomist and physiologist. He received priestly orders in the Catholic Church, and for a time was engaged in parochial duties, and in 1826 became professor of church history and canon law in the University of Munich. In 1845 he entered the Bavarian Parliament, representing the University of Munich, and four years later voted in the Frankfort Diet for the separation of church and state. In 1861 he advocated the abandonment by the papacy of its temporal power, and in 1870 opposed the action of the Œcumenical Council in decreeing the infallibility of the pope. April 17, 1871, he was excommunicated by the Archbishop of Munich, but his popularity remained unimpaired. In 1871 he was elected rector of the University of Munich. He founded the "Old Catholic" movement and presided over its congress. Dr. Döllinger was the author of numerous publications bearing on church matters in which he took a part during his life, as well as works of a historical character. Among them are *The Doctrine of the Eucharist During the First Three Centuries* (1826); *Origins of Christianity* (1833–35); *Treatise on the History of the Church* (1838); *The Religion of Mohammed* (1838); *The Reformation: Its Interior Development and Its Effects* (1846–48); *Sketch of Luther* (1861); *Hippolytus and Callistus; or, the Roman Church in the First Half of the Third Century* (1854); *The Gentile and the Jew in the Courts of the Temple of Christ* (1857); *The First Age of Christianity* (1860); *The Church and the Churches; or, The Papacy and the Papal Power* (1861); *Papal Legends of the Middle Ages* (1863); *A Few Words on the Infallibility Address* (1870); *Lectures on the Reunion of the Churches* (1872); *History of the Ethical Controversies in the Roman Catholic Church Since the Sixteenth Century, with Contributions to the History and Characteristics of the Jesuits* (1889); *Contributions to the History of the Sects of the Middle Ages* (1890). He died at Munich, Jan. 10, 1890.

DOLLY VARDEN TROUT (*Salvelinus malma*), a large fish resembling the eastern brook trout (*S. fontinalis*), found in cold rivers of the Pacific Coast. It is also known as malma, or bull-trout.

DOLMENS. See RUDE STONE MONUMENTS, Vol. XXI, p. 52.

DOLOMITE. See GEOLOGY, Vol. X, p. 228.

DOLPH, JOSEPH NORTON, an American statesman; born at Dolphsburg, New York, Oct. 19, 1835; attended the Genesee Wesleyan Seminary at Lima, New York; studied law and was admitted to the bar at Binghamton, New York, in 1861. In 1862 he was appointed orderly sergeant in Crawford's Company, which was raised for the protection of emigrants to the Pacific Coast, against hostile Indians, and was known as the "Oregon Escort." He settled at Portland, Oregon, in 1862; was elected city attorney in 1864; the same year being appointed, by President Lincoln, district attorney. After serving four terms in the state senate, he was elected to the United States Senate in 1883, and again in 1889. Died in Portland, Ore., March 10, 1897.

DOM OR DON, a title originally assumed by the popes, from whom it descended, in France at least, to bishops and other dignitaries, and finally to monks. In Portugal the title *dom* is confined to the sovereign and his family. The Spanish *don* was confined originally to the nobility, but is now bestowed, by courtesy, as indiscriminately as the English "Mr." or "gentleman." The feminine *doña*, in like manner, is given to ladies.

DOMBEY, JOSEPH, a French botanist; born in 1742. In 1776 he was appointed botanist of the Jardin des Plantes. In 1777 he was sent to South America to collect such useful plants as could be cultivated in France. The specimens that he gathered were captured by the British and sent to the British Museum, where they still remain. His second shipment was confiscated by the Callao authorities. In 1782 he visited Chile. During his stay the cholera broke out and he was appointed physician-in-chief at Concepcion. In 1785 he returned to France. Eight years later he was sent on a mission to the United States, but was captured by privateers and imprisoned in Montserrat, where he died, in 1794.

DOME, MRS. ZOLTAIN F. (MME. NORDICA), the American prima donna. Her maiden name was Lillian B. Norton, and she was born at Farmington, Maine, about 1858. She received her first musical training at the Boston Conservatory of Music, where she greatly distinguished herself. She finished her studies in Italy, and then went to London, where she achieved great success. She then appeared on the Continent and in the United States. Her impersonation of Marguerite in Gounod's *Faust* was a triumph, Gounod himself regarding it as second only to that of Mme. Patti. About 1882 she married Mr. Gower, who died shortly after. On May 27, 1896, she was married, at Indianapolis, Indiana, to Mr. Zoltain F. Dome, who sang for the first time in opera at the Bayreuth festival in 1894, in *Parsifal*, taking the title rôle.

DOMESTIC ARCHITECTURE. The external forms and internal arrangements of the domestic abodes of a people are far more influenced by their manners, habits and occupations, and by the climate in which they live, than their ecclesiastical edifices and public buildings, and there is, consequently, no department of architecture which is so varied and national as domestic architecture. But not only are the circumstances of each country different in this respect, but the same is the case with every department in each country, with every town in each department, with every street in each town; and a domestic architecture which fulfills its object will not only adapt itself to the necessities, but will also make the best, in point of artistic effect, of the

specialties of every case with which it is called upon to deal. The circumstances of families, and even the tastes and fancies of individuals, are legitimate subjects of consideration in domestic architecture. See also ARCHITECTURE, Vol. II, pp. 382–475, and in these Supplements.

DOMETT, ALFRED, an English poet; born at Camberwell Grove, Surrey, May 20, 1811; studied at St. John's College, Cambridge, from 1829 to 1833, but did not graduate. He visited the United States, remaining two years, and on his return home contributed some poems to *Blackwood's Magazine*, among which was his *Christmas Hymn*. He next traveled on the Continent for two years, and in 1841 was admitted to the bar. In 1842 he went to New Zealand as one of the first settlers. His departure from England was signalized by his intimate friend, Browning, in the poem *Waring;* the same poet also wrote of him in *The Guardian Angel*. He became secretary of the colony in 1851, and prime minister in 1862, and was made a C.M.G. He returned to England in 1871, and thenceforth devoted himself to literature. He published *Poems* (1832); *Venice*, a poem (1839); *Ranolf and Amohia: A South Sea Day-Dream* (1872); *Flotsam and Jetsam: Rhymes Old and New* (1877). He was also the author, in prose, of *A Narrative of the Wairau Massacre* (1843). He died Nov. 11, 1887.

DOMINO, the name formerly given to the garb worn in winter by priests while officiating in cold edifices. It is now used to signify a masquerade costume, consisting of an ample cloak or mantle with wide sleeves.

DOMINOES, the name of a game, usually played with twenty-eight oblong, flat pieces of ivory or bone, etc., each of which bears two numbers marked by points from naught to six. The attempt has been made to trace the game of dominoes back to the Greeks and Hebrews, and also to the Chinese. It is certain that it was introduced about the beginning of the eighteenth century from Italy into France, where it immediately became popular in the larger towns. It is a game requiring some skill, considerable powers of calculation being necessary to make the best combinations with the different numbers on the pieces.

DOMINUS, the Latin word which we commonly render "lord," but which more properly signifies master, as opposed to the slave (*servus*). Aurelianus is said to have been the first emperor who adopted *dominus* as a title of honor on his medals, though it had long been made use of in conversation and in correspondence in that sense. In legal phraseology, the *dominus litis* is the person really interested in the issue of an action, though not necessarily the pursuer.

DONALDSON, JAMES LOWRY, an American soldier; born at Baltimore, Maryland, March 17, 1814. He entered the army in 1836, and served in the Florida War, the Mexican War and the Civil War. He attained the rank of colonel on the staff, and received the brevet of major-general of volunteers. He published *Sergeant Atkins*, a tale of the Florida War (1871). He died in Baltimore, Nov. 4, 1885.

DONALDSONVILLE, a railroad and river town of central southern Louisiana, formerly the capital of the state, and now the capital of Ascension Parish. It is situated on the Mississippi River, 64 miles above New Orleans, and at the head of Bayou Lafourche, and on the Texas and Pacific railroad. The town has excellent advantages for trade, and manufactures ice, bricks and lumber; has electric lights and a city water-supply. Population 1890, 3,121.

DONAX, a bivalve mollusk with triangular shell, found living and fossil in Europe and America.

DONDRA HEAD, the most southern extremity of Ceylon. As compared with Cape Comorin, the corresponding point in the peninsula of Hindustan, it more directly faces the Indian Ocean, and lies nearer the grand thoroughfares of Eastern commerce. An adjacent village of the same name has 900 inhabitants.

DONELSON, ANDREW JACKSON, an American politician; born near Nashville, Tennessee, Aug. 25, 1800. From 1820 to 1822 he served in the army, but resigned, and was admitted to the bar in 1823. He was private secretary to President Jackson during his two terms, and in 1844 was appointed *chargé d'affaires* to the republic of Texas. In 1846 he became minister to Prussia, and in 1848 to the federal government of Germany. He was the nominee for Vice-President on the ticket with Millard Fillmore in 1856, and after his defeat in the election retired from public life. Subsequently he practiced law in Memphis, where he died, June 26, 1871.

DONELSON, FORT, an important Confederate fortification on the Cumberland River, in northwest Tennessee. It was 12 miles from Fort Henry, on the opposite bank of the Tennessee River, both forts being in Stewart County. They were connected by road, and were about forty miles above the junction of the two rivers with the Ohio, and commanded the navigation of the rivers upon whose banks they were situated. They were of great strategic importance to the Confederates in their operations in the territory between Memphis and Bowling Green in the winter of 1861–62. The Federals decided upon a combined attack on these forts in January, 1862. A fleet of seven vessels, under the command of Commodore Andrew H. Foote, left Cairo, Illinois, February 2d, to be followed by an army consisting of 15,000 men, commanded by General Grant, who was delayed by bad roads. Foote, being impatient, opened fire on Fort Henry, February 6th, the fort being defended by 17 guns and 3,000 men under General Tilghman, who was forced to surrender in little more than an hour. General Tilghman and about seventy of his men were captured, the others of the garrison escaping to Fort Donelson. General Grant, after waiting to repair the damage done to the gunboats, pushed on Fort Donelson on February 12th, and arrived in front of the works the same day. Fort Donelson had been considerably reinforced by the arrival, on the 9th, of General Pillow, on the 12th, of General Buckner, and on the morning of the 13th, of General John B. Floyd. The latter assumed command of the entire force, now consisting of 16,000 men. The high ground to the rear of the fort had been well protected, and the whole aspect of affairs indicated

the difficulty of the capture of the place by the Unionists. General Grant at once commenced operations by investing the lines of the enemy, upon whom he also opened a cannonade, begun on the morning of the 13th. In the afternoon of the same day General McClernand attempted an assault upon the fort, but was repulsed with considerable loss. The next day the arrival of 10,000 additional troops raised the total number of land forces under Grant to 27,000. A combined attack then was determined upon by the land forces and the fleet. The fleet, however, had to commence operations alone, as General Grant found it impossible to get his troops into position to aid the attack of the fleet, which was compelled to retire after an hour and a half, every gunboat being more or less disabled, and 54 men being killed or wounded. General Grant then made his investment of the Confederate lines more complete and sat down to await the arrival of his reinforcements. The Confederates were quite aware of the situation, and early in the morning of the 15th they made a sudden sortie, but were at once met by the fire of their opponents. The engagement lasted until well in the afternoon, when General Grant ordered a general advance all along the line, driving the Confederates back upon their works, a position on the left within the Confederate lines being gained by the Federals. The loss on each side, in killed and wounded, was 2,000. The next morning, while General Grant was arranging for a more determined attack, the Confederate generals held a hurried consultation, when it was agreed by them to surrender. Generals Floyd and Pillow, with about two thousand men, escaped, leaving General Buckner to his own resources. The latter dispatched a flag of truce to General Grant to secure an armistice until noon and to inquire the terms of surrender. General Grant then sent back the reply to the Confederate general, which at once made his name famous when it became known to the world: "No terms other than unconditional surrender can be accepted. I propose to move immediately upon your works." The Confederates, having no other resource, at once accepted the terms; 14,625 prisoners, 65 cannon, 17,000 small arms, besides quantities of stores and munitions, fell into the hands of the Federals. The total loss of the latter was 2,832 killed, wounded or missing.

DONGAN, THOMAS, a colonial governor of New York; born at Castletown, Ireland, in 1634. At an early age he entered the British army, and later the French army. Subsequently he was made lieutenant-governor of Tangiers, and in 1682 became governor of the colony of New York. He resigned in 1688, and returned to England three years later, dying in London, Dec. 14, 1715.

DONNELLY, IGNATIUS, an American author and politician; born in Philadelphia, Nov. 3, 1831. In 1857 he went to Minnesota, became lieutenant-governor in 1859, and Congressman from December, 1863, to March, 1869, being elected as a Republican. He wrote *Atlantis, the Antediluvian World* (1882); and *Ragnarok* (1883); and in a work called *The Great Cryptogram*, published in 1888, attempted to prove that Francis Bacon was the author of the plays attributed to Shakespeare.

DONNER LAKE, a small mountain lake between Sierra and Nevada counties, northeastern California, in a chasm of the Sierra Nevada, 13 miles N.W. of Lake Tahoe. It is a summer resort, and derives its name from a man named Donner, who led a band of emigrants in 1846, most of whom, being snow-bound, perished of starvation on the shores of this lake; those, however, who did escape starvation did so by eating the flesh of their dead comrades.

DOO, GEORGE THOMAS, one of the best English historical engravers of the century; born in the parish of Christ Church, Surrey, Jan. 6, 1800. His admirable rendering of Eastlake's *Italian Pilgrims Coming in Sight of Rome;* his exquisitely finished heads of women and children, after Lawrence; his engravings, *The Infant Christ*, from Raphael; *Ecce Homo*, from Correggio; *Knox Preaching Before the Lords of the Covenant*, from Wilkie, etc., have succeeded in winning for him a high place in the estimation of the admirers of his laborious art. In 1836 he was appointed historical engraver to William IV, and in 1842 to Queen Victoria. In 1851 he was elected a fellow of the Royal Society, and in 1856 a royal academician. He died Nov. 13, 1886.

DOOLITTLE, JAMES ROOD, an American lawyer and public man; born at Hampton, N. Y., Jan. 3, 1815. He began the practice of law in 1837, and became district attorney of Wyoming Co., N. Y., in 1845. In 1853 he was made judge of the first judicial circuit of Wisconsin, and in 1857–69 served as United States Senator. He retired from public life in 1869, and resumed the practice of his profession in Chicago. Died in Edgewood, R. I., July 27, 1897.

DOOM, the old name given to the last judgment and to those representations of it in churches which have a religious rather than an artistic object. Many of the dooms are executed in distemper. In the reign of Edward VI most of them were washed over or otherwise obliterated as superstitions. There is a fine one still remaining in the Church of the Holy Trinity, at Coventry, England.

DOOM (OR DOUM) PALM. See ARABIA, Vol. II, p. 237.

DOON, a Scotch river rising in the southeast of Ayrshire, in Loch Enoch; runs northwest through Loch Doon, past Dalmellington, Burns's Monument and Alloway Kirk, to the Firth of Clyde. It was immortalized by Robert Burns in his poem *Ye Banks and Braes o' Bonnie Doon*, which has been read and sung wherever the English language is known.

DOOR AND DOORWAY. In art the form of the door is determined by the architectural style of the building in which it is placed. In classical buildings it is generally rectangular in form, though both Greeks and Romans, following the Egyptians, among whom the practice was almost universal, occasionally diminished the opening toward the top, and the Romans, in later times, very frequently threw over it the circular arch, which was the characteristic feature of their style. Egyptian doors are known to us, for the most part, only by the examples which remain in monumental structures, and these, like the other mem-

bers of the style thus exhibited, are of gigantic proportions. The door of the temple at Edfoo measures seventy-four feet to its summit. With the Egyptians the door was an architectural object of very great importance. On either side colossal statues or obelisks were placed, and often the approach to it was lined with rows of gigantic sphinxes. The Greek door was surrounded by moldings, and as the lintel or top stone which covered it projected on both sides beyond the jambs, the moldings which ran around both sides jutted out at the place of meeting, forming a sort of shoulder. This arrangement, however, was by no means uniform, the moldings of the jambs often being separated from those of the architrave, as is the beautiful door of the Erechtheum. The doors themselves, in private dwellings of antiquity, were usually of wood, and in structures devoted to religious or public purposes, of metal, and occasionally of marble. They generally were paneled, and turned on pivots working in sockets. With the exception of the forms of the windows and the tracery and foliage of the pillars, doors are the most characteristic features of all the styles of Gothic architecture.

DOORGA OR DURGA, a Hindu divinity, one of the names given to Paravati, the consort of Siva. She is the Amazonian champion and protectress of the gods, and has been compared to the Olympian Juno, and the Pallas or armed Minerva of the Greeks. She is represented with ten arms. In one hand she holds a spear, with which she is piercing the giant Muhisha; in another, a sword; in a third, the hair of the giant, and the tail of the serpent turned around him; and in others, the trident, discus, axe, club and shield.

DOORNBOOM, a Dutch name given to an acacia (*A. horrida*) of South Africa, on account of its horrid armature of spines.

DORA D'ISTRIA, pseudonym. See KOLTZOFF-MASSALSKY, in these Supplements.

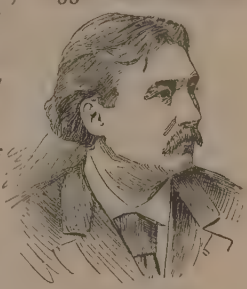
DORAMA, a town of Nejd, central Arabia, about thirty miles N.E. of El Derageh. It is a provision station for Mecca caravans. In 1818 Ibrahim Pasha took the town and killed most of its inhabitants. Population, 8,000.

DORAN, JOHN, an English author; born in London in 1807. His early years were passed in France. He was educated chiefly by his father, and was for years tutor to several noble families, and then traveled extensively. On his return to England he took up his residence in London, and devoted himself entirely to literature. At the age of fifteen he produced a melodrama, *The Wandering Jew*, played at the Surrey Theater in 1822. Among his other works are *Table Traits; Habits and Men; Knights and their Days; Queens of England of the House of Hanover; Monarchs Retired from Business; History of Court Fools*, the great work on the subject; *The Book of the Princes of Wales; Their Majesties' Servants*, annals of the English stage; *Saints and Sinners; Memoirs of Our Great Towns; In and About Drury Lane;* etc. He died in 1878.

DORCHESTER, formerly a town of Norfolk County, Massachusetts, on Dorchester Bay, four miles S. of Boston. It was settled by Puritans in 1630, who named it for the town in England, whence most of them came. In March, 1776, Washington, by seizing Dorchester Heights, which commanded Boston and the harbor, was able to force the British to evacuate. The town was annexed to Boston in 1869, and now constitutes the Sixteenth Ward.

DORCHESTER, a port of entry of Westmoreland County, eastern New Brunswick, 19 miles S.E. of Moncton, on Shepody Bay and the New Glasgow railroad. It has a good situation and a large trade. Gas-coal and building-stone are exported in quantities. Population 1891, 6,357.

DORÉ, PAUL GUSTAVE, a French artist; born at Strasburg, Jan. 6, 1833. He was educated in Paris, and early displayed superior talent. He first contributed sketches to the *Journal pour Rire* and other Paris periodicals, and in 1855 his picture of the *Battle of the Alma* was exhibited, and in 1857 followed the *Battle of Inkermann*. Besides executing a mass of miscellaneous works, he illustrated Tennyson's *Idyls of the King*, Coleridge's *Ancient Mariner*, Dante's *Inferno*, Poe's *Raven*, the *Legend of the Wandering Jew*, and the Bible, and also reproduced and exhibited in Paris and London many of his designs. The Doré Gallery, used for this purpose, has been open in London for several years, and it has since been exhibited in the United States. *Christ Leaving the Prætorium* is his most important painting. The slightest of Doré's productions shows that he was an artist and poet, and excites a greater interest than many works less characterized by hastiness and mannerism. Doré received the decoration of chevalier of the Legion of Honor in 1861, and officer in 1879. He died in Paris, Jan. 27, 1883.



GUSTAVE DORÉ.

DOREMUS, ROBERT OGDEN, an American chemist, son of Sarah Platt Doremus; born in New York City, Jan. 11, 1824, graduated at the University of New York in 1842, and became assistant to Professor John W. Draper the following year, remaining in this position until 1847, when he went to Europe to further prosecute his studies. Returning, he was elected professor of chemistry in the New York College of Pharmacy in 1849. He took his degree from the New York University in 1850. In the same year he helped in organizing the New York Medical College, and equipped the first laboratory in the United States for training medical students in analytical chemistry. In 1861 he was appointed to the chair of chemistry and toxicology in Bellevue Hospital Medical College. In 1862 he went to Paris, remaining two years; introduced the use of granulated gunpowder for fire-arms; and patented a

cartridge that required no serge envelopes, hence did away with the necessity of sponging in muzzle-loading cannon. His improvements were adopted by the French government. He was called from Paris to fill the chair of chemistry and physics in the College of the City of New York. He soon was recognized as the most expert toxicologist in America, and his assistance was called into requisition in coroners' cases. In 1865 and 1875 his chlorine-gas method of quick disinfection of vessels infected with cholera was adopted.

DOREMUS, Sarah Platt, an American philanthropist; born in New York City, Aug. 3, 1802, and in 1821 married Thomas C. Doremus, a merchant, who put his wealth at her disposal in her charitable designs. With eight ladies she organized the Greek relief mission in 1828, and in 1836 she aided Madame Henriette in the latter's work in the Grande Ligne mission of Canada, becoming president of the organization in 1860. In 1840 she was successful in establishing Sunday services in the New York City prisons, and in 1842 was instrumental in founding the home for women discharged from prison. This home is known as the Isaac T. Hopper Home, and Mrs. Doremus was made its president in 1867. In the same year she became president of the House and School of Industry for Poor Women, which she had founded in 1850. In 1854 she became vice-president of the Nursery and Child's Hospital, and in 1855 assisted in founding the New York Women's Hospital, of which she also became president. During the Civil War she devoted herself to ministering to the sick and wounded soldiers of the North and the South. In 1860 she founded the Women's Union Missionary Society, and took an active part in organizing, in 1866, the Presbyterian Home for Aged Women. During the famine in Ireland in 1869, she collected relief supplies, and was a manager of the City Mission and Tract Society and of the Female Bible Society. During all these charitable activities Mrs. Doremus reared a family of nine children of her own, besides others she had adopted. She died in New York City, Jan. 29, 1877.

DORION, Sir Antoine Aimé, a Canadian statesman; born at Ste. Anne de la Perade, in the province of Quebec, Jan. 17, 1818; educated at Nicolet College, and admitted to the bar in 1842; was a representative in the Canadian Assembly for Montreal from 1854 to 1861, for Hochelaga from 1862 to 1867, and for the same county in the Dominion Parliament from 1867 to 1872, when he was elected for Napierville, which he represented until 1874, when he was elevated to the bench as chief justice of Quebec. He was commissioner of crown lands (1858); provincial secretary (1862–63); attorney-general of Lower Canada (1863–64); minister of justice (1873–74); administrator of the province of Quebec (1876); and a privy-councilor from 1873. He was knighted in 1877. Died May 31, 1891.

DORIS. See Mollusca, Vol. XVI, p. 657.

DORN, Johann Albrecht Bernhard, a German Orientalist; born at Scheuerfeld, Saxe-Coburg, March 11, 1805. In 1829 he was appointed ordinary professor of Oriental languages at the Russian University of Charkow, and in 1845 became professor of history and Asiatic geography at the Oriental Institute at St. Petersburg. In 1843 he was made keeper of the Imperial Library and director of the Asiatic Museum. He published many translations of Oriental works on history and geography, and also a valuable book as the result of a scientific journey to the Caucasus, entitled *Caspian Invasion of the Ancient Russians in Taberistan.* He died in St. Petersburg, May 31, 1881.

DORNICK, DORNIC or DORNOCK, a species of figured linen, deriving its name from Dornich, or Tournay, in the Netherlands, where it was formerly made in considerable quantity.

DORR, Thomas Wilson, an American politician; born at Providence, Rhode Island, Nov. 5, 1805; graduated at Harvard in 1823, and was admitted to the bar and practiced in Providence. He was a member of the state assembly, being elected as a Federalist, but became a Democrat, exerting himself in securing a more liberal franchise to the people. The state at this time was governed under an old charter granted in 1663 by Charles II, in which the suffrage was limited to possessors of real estate to the amount of $134, and to the eldest sons of these owners. The representation was also greatly disproportionate to the population of the various districts and towns. After fruitless efforts in the assembly, Dorr organized a suffrage party in 1841. A state convention was held at Providence on October 4th, and a constitution framed, which was submitted to the people in December and carried by a majority of the adult male citizens. It was claimed that it was carried by a majority of the legal voters. The legislature likewise called a convention, framed a constitution, and submitted it to the people in March, 1842, when it was rejected. Elections were held under the "Suffrage" constitution and also under the old charter, resulting in the election, for the respective parties, of T. W. Dorr and Samuel W. King. On May 3d, both governments organized. King called out the militia, proclaiming martial law, at the same time asking Federal aid, the national government recognizing him as the legal governor. The Suffragists attempted to gain possession of the arsenal at Providence, but failed. Dorr went to Washington to plead the cause of his party, and on his return received assurance that the people would defend their rights by arms. But the number who turned out was a mere handful, and Dorr advised them to disperse, thus securing peace. In the same month (June) another call for a convention was issued by the legislature, which met and finally adopted the present constitution, which embodied nearly all the points for which the Suffragists had contended. This was approved unanimously by the people. Thus "Dorr's rebellion" terminated. He was, on his return from New Hampshire, whence he had fled, arrested, tried for high treason, and condemned to

imprisonment for life, June 24, 1844. He was released three years later under a general amnesty, and restored to his civil rights in 1851. The legislature passed a bill to reverse the judgment in his case, in 1853, but the supreme court of the state declared the act unconstitutional. The next year, December 27th, Dorr died at Providence.

DORSEY, James Owen, an American ethnologist; born in Baltimore, Maryland, Oct. 31, 1848; studied at the Theological Seminary of Virginia (1867–71); ordained a deacon (1871), and was sent to Dakota among the Ponca Indians as Protestant Episcopal missionary, remaining two years. He then returned to Maryland and was afterward appointed ethnologist to the United States Geological and Geographical Survey of the Rocky Mountains, and transferred to the Bureau of Ethnology in 1879. Up to 1884 he had made a study of the language, mythology and sociology of the Siouan tribes, and later extended his researches to the numerous Oregon tribes. In 1885 he was made general secretary of the Anthropological Society of Washington; in the same year, vice-president of the Anthropological section of the American Association for the Advancement of Science; and in 1886 received a gold medal for his sociological works from the Royal Italian Didactic Society, of which he was also made a member. His publications include *Ponka A B C Waba-ru* (1873); *Siouan Phonology* (1883); *Osage War Customs* (1884); *Kansas Mourning and War Customs* (1885); *Omaha Sociology* (1885); *Siouan Migrations* (1886); *Indian Personal Names* (1886).

DORSHEIMER, William, an American lawyer and journalist; born at Lyons, New York, Feb. 5, 1832. From 1867 to 1871 he was district attorney for the northern district of the state of New York, and lieutenant-governor from 1875 to 1880. In 1883 he became a member of Congress, and in 1885 received the appointment of United States district attorney for the southern district of New York. The same year he became editor of the New York *Star*. He is the author of *Life and Public Services of Grover Cleveland* (1884). Died at Savannah, Georgia, March 26, 1888.

DORSIVENTRAL, in botany, a term applied to a plant body or organ which has two surfaces, dorsal and ventral, which differ from each other in structure or in the organs they bear. A thallus, such as that of liverworts, is an example of a dorsiventral body; many foliage leaves are examples of dorsiventral organs.

DORTURE (old Eng., *dorter;* Fr., *dortoir*), a long room in a convent, divided into a succession of small chambers, or cells, where the inmates sleep. It usually has immediate access to the church or chapel, for the convenience of attendance on services during the night.

DORY (nautical), a small boat of simple construction, flat-bottomed, and much used in seafisheries as a go-between from the larger boat and the shore, in loading and unloading. It is also used to go in from the larger vessel in catching fish.

DOSTOYEVSKY, Feodor Mikhailovitch, a Russian novelist; born at Moscow, Nov. 11, 1822. His first story, *Poor People* (1846), which painted with unsparing truth the condition of the peasantry, and the more hopeless state of the poor in the cities, at once drew attention to him, and to several less noteworthy works that followed. At this period he became involved in Communist plots, and in 1849 was deported to Siberia. In 1856 he was permitted to return to St. Petersburg, where he published an account of his prison-life. His masterpiece, *Crime and Punishment*, which appeared in 1866, is one of the most powerful and affecting works in the whole range of modern fiction. He died Feb. 9, 1881.

DOTEREL (*Charadrius morinellus*), a species of plover inhabiting northern Europe and Asia in summer, breeding chiefly in the highest latitudes. On the approach of winter, it migrates to the countries around the Mediterranean, and to others of similar climate. See Killdeer, Vol. XIV, p. 76.

DOUAY or DOUAI BIBLE, The, a version of the Holy Scriptures (Old Testament), the authorized version of the Roman Catholic Church. Roman Catholic exiles from Great Britain made Douay their headquarters for over two centuries. In 1558 political disturbances led to a migration of the college they had there established to Rheims. It was at the latter place that the English translation from the Latin Vulgate was begun by Dr. Gregory Martin, with the assistance of William (afterward Cardinal) Allen, Dr. Bristow, William Reynolds, and others. In 1582 these men were able to publish the translation of the New Testament. The Old Testament, also translated by Dr. Martin, with copious annotations of an intensely Roman Catholic nature by Dr. Worthington, was finished and published in 1610, at Douay. Hence this translation of the Bible as a whole is called the Douay Bible.

DOUBLE CONSCIOUSNESS, a term applied by some to an abnormal condition having various forms, and arising probably out of latent modifications of the mind. The patient may have alternate periods in which he has no recollection in one of what occurred in the other, or he may imagine himself successively to be different persons, or he may seem to himself to be confronted by another personality within him, as in the case of demoniacal possessions in the New Testament.

DOUBLEDAY, Abner, an American soldier; born at Ballston Spa, New York, June 26, 1819; graduated at West Point in 1842. He served in the Mexican War; was made a captain in 1855, and served against the Seminoles. He leveled the first gun fired in defense of Fort Sumter, April 12, 1861; rose to the rank of brigadier-general in 1862, and was assigned to the defense of the district around Washington. He commanded a brigade on the Rappahannock, and also at Bull Run, where he succeeded to the command of Hatch's division; was promoted to be major-general of volunteers, and fought at Fredericksburg, Chan-

cellorsville and Gettysburg. In the summer of 1864 he commanded the southeastern forces when the capital was threatened by Early. In 1865 he was brevetted brigadier and major-general in the regular army for his services during the war. He remained in active service until 1873. His published works are *Reminiscences of Forts Sumter and Moultrie* (1876); *Chancellorsville and Gettysburg* (1882); *Gettysburg Made Plain* (1888). He died at Mendham, New Jersey, Jan. 26, 1893.

DOUBLE STARS. See ASTRONOMY, Vol. II, p. 818.

DOUBLE-SHOTTING, an augmentation of the destructive power of ordnance, by doubling the shot fired off at one time from a gun. Sometimes three shots are fired at once, in which case the piece is said to be "treble-shotted."

DOUBLING GAP SPRINGS, a health-resort of Cumberland County, Pennsylvania, central southern Pennsylvania, 30 miles W. of Harrisburg. Many chronic diseases are cured by the use of water from these springs. Some of the springs are saline-sulphuric, and others are carbonated saline chalybeate.

DOUBLING THE CUBE, a celebrated geometrical problem among the ancients. The object was to find the side of a cube whose contents should be twice that of another given cube; and various accounts are given of how the problem was suggested.

DOUBLOON, a Spanish coin, originally equal in value to a double pistole, from which fact it took its name. From 1730 to 1772 the value of the double pistole was equivalent to $8.24; from 1772 to 1786, $8.08; and from 1786 to 1848 to $7.87. The current Spanish doubloon of Isabella II, of 1848, is of the value of 100 reals and is worth a little more than $5.02, which value it retained until 1868. The coinage of doubloons has ceased in Spain.

DOUCET, CHARLES CANILLE, a French dramatic author; born in Paris, May 16, 1812; studied law and practiced as a notary. He soon began to devote himself to dramatic composition, and produced, in collaboration with Antoine Bayard, in 1838, the vaudeville *Léonce*. He wrote a number of plays, which were published in 1858, under the title *Comédies en Vers*, and which were produced at the Théâtre Français. They included *Un Jeune Homme; L'Avocat de sa Cause; Ennemis de la Maison;* and *Le Fruit Défendu*. He produced, also, many other works, both of a poetical and dramatic nature, such as *La Considération*, a drama in four acts (1860); *Le Chant du Cygne* and *Le Juin, 1606*, both in verse. In 1853 he became divisional chief of theaters, and had in this capacity the supreme charge of the Paris theaters as well as those in the departments. In 1865 he was elected a member of the Academy and, 11 years later, became its permanent secretary. He was elected several times as member of the council-general of the Yonne for the district ot Ville-Neuve l'Archevêque, and in 1891 was promoted to be grand officer of the Legion of Honor. He died in Paris, April 1, 1895.

DOUCET, HENRY LUCIEN, a French artist; born in Paris, August 23, 1856; entered the School of Fine Arts in 1874; and was a pupil of Lefebvre and of Boulanger. He obtained the *Grand Prix de Rome* in 1880, and made his *début* at the Salon in 1877 with *Adam and Eve;* afterward producing a great number of works and portrait designs. His *Mme. Galli-Marié* of the Opera Comique, was a remarkably striking portrait. Among his other works are *Atala* (1878); *Après le Bal* (1888); and *Figure Nue* (1890); *Portraits de Mes Parents* (1891). He obtained a gold medal at the exposition of 1889; and received the decoration of the Legion of Honor in 1891.

DOUGHERTY, DANIEL, an American political orator, the son of a poor Irishman; born in Philadelphia, Oct. 15, 1826; admitted to the bar in 1849, and made many notable political speeches in support of Democracy. He joined the Republican party during the War, his speeches in advocacy of Lincoln's candidacy being notable, but subsequently returned to the Democrats and nominated General Hancock in 1880, and Cleveland in 1888. He gained the soubriquet of the "silver-tongued orator," and was very popular on the lecture platform, his best-known efforts being *The Stage; Orators and Oratory;* and *American Politics*. His greatest public effort is regarded to have been his address at Baltimore, Nov. 11, 1889, at the opening of the Roman Catholic Lay Congress. Died in Philadelphia, Sept. 5, 1892.

DOUGLAS, ARCHIBALD, EARL OF ANGUS. See SCOTLAND, Vol. VII, pp. 495 et seq.

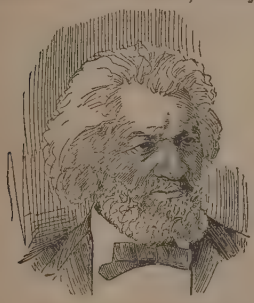
DOUGLAS, GEORGE CUNNINGHAME MONTEATH, a Scottish divine; born March 2, 1826, at Kilbarchan, Renfrewshire; educated at the University of Glasgow, and at the Free Church New College, Edinburgh; was minister at Bridge of Weir, in his native county, and became professor of Hebrew and Old Testament exegesis, and later principal in the Free Church College, Glasgow. He published *Why I Still Believe that Moses Wrote Deuteronomy* (1878); *The Book of Judges* (1881); *The Book of Joshua* (1882); *The Six Intermediate Minor Prophets* (1890); and *A Short Analysis of the Old Testament* (1889).

DOUGLAS, SIR HOWARD, an English general, son of Admiral Sir C. Douglas; born at Gosport, in 1776; entered the army when young, and served in Spain and Portugal. He was governor of New Brunswick, Lord High Commissioner of the Ionian Islands, and from 1842 to 1847 he was member of Parliament for Liverpool. In 1851 he became a general. He disapproved of the method of warfare in the Crimea in 1855, declaring that Sebastopol could not be reduced unless by a change in the plan of operations, such as he traced; and his prophecy was verified by the event. Among his works his *Naval Gunnery*, regarded as a standard authority outside of Britain, was not adopted as such by the British government until thirteen years after its publication. He died Nov. 9, 1861.

DOUGLASS, DAVID BATES, an American engineer; born at Pompton, New York, March 21,

1790; graduated at Yale in 1813; appointed second lieutenant, corps of engineers, United States army, and put in command of sappers and miners at West Point. He took part in the battles of Niagara and Lundy's Lane, and accomplished the repair of Fort Erie in face of the enemy's fire, for which he was promoted first lieutenant and brevetted captain. He resigned from the service in 1831, on his appointment as chief engineer of the Morris Canal Company of New Jersey, in which he introduced the use of inclined planes instead of locks, the construction being completed in 1832. From 1833 until 1836 he was identified closely with the planning and construction of the Croton aqueduct to supply the city of New York with water. He engineered Greenwood Cemetery, Brooklyn (1838–41); designed the supporting-wall for Brooklyn Heights, and planned the water-works for the same place. His professorial appointments included chairs of civil and military engineering at West Point (1823); of natural philosophy and civil engineering in the University of New York (1832); of mathematics at Hobart College, New York (1848), and he was president of Kenyon College, Ohio (1841–44). He died at Geneva, New York, Oct. 9, 1849, and was buried in Greenwood Cemetery.

DOUGLASS, FREDERICK, an American orator; born in Tuckahoe, Maryland, in February, 1817; His mother was a mulatto slave, and his father a white man. At the age of nine years he was "hired out" by his master, and became the inmate of a household where he was taught to read and write. In 1832 he was purchased by a Baltimore ship-builder, by whom he at first was employed as waiter on the workmen, and afterward became a ship-calker. In September, 1838, he made his escape from slavery, and went to New Bedford, Massachusetts, and, in course of a year or two, developed considerable ability as a public speaker. On the recommendation of William Lloyd Garrison, the American Antislavery Society engaged him as one of their lecturers, and he soon attracted large audiences to hear his descriptions of slavery. During this time he published *Narrative of My Experience in Slavery*. In 1845 he published *My Bondage and My Freedom*, which was republished in 1855, and enlarged in 1881. In 1845 he visited England, where his public addresses were well received. His friends there collected on his behalf about $750, which was sent to his former master wherewith to secure his legal emancipation. In 1846 he was enabled to purchase his freedom in due form of law. Some years later Douglass went to Rochester, New York, where he established two weekly newspapers. In 1870 he published, in Washington, a newspaper, *The New National Era*, and in 1871 was appointed secretary of the commission to Santo Domingo. In 1872 he was chosen a Presidential elector from New York, and from 1877 to 1881 officiated as United States marshal for the District of Columbia. Subsequently he was appointed commissioner of deeds for the District of Columbia. He was removed from this office in 1886, and soon afterward visited England. He married a white woman in 1884. In 1889 President Harrison appointed him minister to Haiti. In 1892 the Haitian government appointed him senior commissioner to the Columbian Exposition. Died at Cedar Hill, on Anacostia Heights, a suburb of Washington, Feb. 20, 1895.



FREDERICK DOUGLASS.

DOUGLASS, SIR JAMES NICHOLAS, an English engineer; born in London, Oct. 16, 1826. He studied civil and mechanical engineering, and, after a regular training for the profession, became, in 1847, assistant engineer to his father, who was the superintending engineer to the Trinity House, the English governmental department having charge of lighthouses, buoys, channels and coast navigation, which at that time was engaged in building a lighthouse on the Bishop Rock, the westernmost of the dangerous rocks of the Scilly Isles. After this work was completed, he was appointed resident engineer in sole charge of the erection of a lighthouse on the chief rock of the dangerous group of the Smalls, off Milford Haven. This work he completed with a saving, in cost, to the government, of $75,000 on the amount of the lowest estimate. In 1862, on the death of the engineer-in-chief to the Trinity House, he was appointed to that office, in the execution of which he carried out many important engineering works; amongst others, the erection of the Wolf, Longships, Great and Little Bass, new Eddystone, and Muricoy lighthouses. He effected many improvements in the construction of lanterns and in the mechanism of optical, electrical, oil, and gas illuminating apparatus. He was knighted on the completion of Eddystone lighthouse, in the erection of which he saved $120,000. He was elected a member of the institutions of civil engineers, mechanical engineers, and electrical engineers, and in 1887 a fellow of the Royal Society.

DOUKHOBORTSI. See DUCHOBORTZI, *post*, p. 1087.

DOURO RIVER. See SPAIN, Vol. XXII, 295.

DOUROUCOULI OR DURUKULI, the name of a small South American monkey of the genus *Nyctipithecus*. It is nocturnal in its habits.

DOVE. In Christian art the dove is employed as an emblem of the Holy Ghost, no doubt from the fact of this being the form in which the Spirit descended upon Jesus at his baptism. From the dove being used to symbolize purity, it generally is represented white, with its beak and claws red, as they occur in nature. In the older pictures a golden nimbus surrounds its head, the nimbus frequently being divided by a cross, either red or black. In stained-glass windows we see the dove with seven rays proceeding from it, terminating in seven stars, significative of the seven gifts of the Holy Spirit. Holding an olive branch, the dove

is an emblem of peace. When seen issuing from the lips of dying saints and martyrs, it represents the human soul.

DOVÉ, HEINRICH WILHELM, a German physicist; born at Liegnitz, Oct. 6, 1803. In 1828 he became assistant professor of natural philosophy at Königsberg, and in 1829 at Berlin. He was made full professor in the latter university in 1845, and elected a member of the Royal Academy of Sciences. He applied the stereoscope to the detection of forged bank-notes. Among his many works, the two best known, outside of Germany, are his *Distribution of Heat on the Surface of the Globe*, published by the British Association in 1853; and *The Law of Storms* (1874). He died April 4, 1879. See ACOUSTICS, Vol. I, p. 109.

DOVÉ, RICHARD WILHELM, a German jurist, son of the above; born in Berlin, Feb. 27, 1833. He became privat-docent of the University of Berlin in 1859, professor of the University of Tübingen in 1862, and was elected as a National Liberal to the German Reichsrath in 1871. In 1860 he began the publication of the *Zeitschrift für Kirchenrecht*, a leading periodical in Europe on all questions of church law.

DOVEKIE OR SEA-DOVE. See GUILLEMOT, Vol. XI, p. 263.

DOVER, the capital of Delaware and capital of Kent County, situated five miles W. of Delaware Bay. It contains a state house, seven churches, newspaper offices, several educational institutions, two banks, a flour-mill, several fruit-packing and evaporating houses, a glass factory, a foundry, sash and fruit-crate factory, a carriage manufactory, gas-works and a Mount Holly system of water-works. The city is the center of an extensive fruit-growing region. Population 1890, 3,061.

DOVER, a city of southeastern New Hampshire, and capital of Strafford County. Dover is the oldest town in the state, having been settled in 1623. It is abundantly supplied with water-power from the Cocheco River, which has here a direct fall of 32 feet. The site of the city is hilly or uneven, and many of the streets cross each other obliquely. Population 1890, 12,790. See DOVER, Vol. VII, p. 381.

DOVER, a town and the capital of Piscataquis County, north-central Maine, on the Piscataquis River, and the Bangor and Aroostook railroad, 65 miles N.N.E. of Augusta, in a farming district. It manufactures woolens, pianos and organs, furniture and spools. Population 1890, 1,942.

DOVER, a town of Morris County, central northern New Jersey, on the Rockaway River and Morris canal, and on the New Jersey Central and Delaware, Lackawanna and Western railroads. It manufactures iron, having several forges, foundries, steel-works, rolling-mills and a car factory. Population 1895, 5,021.

DOVER, a village and the capital of Stewart County, western Tennessee, on the Cumberland River, one mile E. of Fort Donelson. It is in a mining region, and has considerable steamboat traffic on the river. A national cemetery is located a quarter of a mile west of the village. Population 1895, 1,181.

DOVER'S POWDER, a preparation of powder of ipecacuanha, one dram; opium, in powder, one dram; and sulphate of potash, one ounce. The whole is thoroughly mixed, and the ordinary dose is from five to ten grains. Occasionally, saltpeter is added, as well as camphor. It acts as a sudorific, increasing the proportion of sweat, or sensible perspiration.

DOW, NEAL, an American temperance reformer; born in Portland, Maine, March 20, 1804; educated at the Friends' Academy, New Bedford, Massachusetts. He was elected mayor of Portland in 1851 and re-elected in 1854. Mr. Dow became a champion of prohibition, and it was through his efforts that the Maine liquor law was passed in 1851. He was a member of the state legislature in 1858–59. At the commencement of the Civil War he was appointed colonel of the Thirteenth Maine Volunteers, and accompanied General Butler's expedition to New Orleans. In 1862 he was commissioned a brigadier-general of volunteers, and placed in command of the forts at the mouth of the Mississippi, and later of the district of Florida. Wounded and taken prisoner in the attack on Port Hudson in May, 1863, he was exchanged after eight months' imprisonment, and resigned in the following year. He devoted himself since to the temperance cause in the United States, Canada and Great Britain, and in 1880 was prohibition candidate for President of the United States. Died in Portland, Me., Oct. 2, 1897.

DOWAGIAC, a city of Cass County, southwestern Michigan, 80 miles W.S.W. of Grand Rapids, on the Dowagiac River, and on the Michigan Central railroad. It has manufactories of stoves, agricultural implements, flour and feed. Population 1895, 3,532.

DOWDEN, EDWARD, an Irish scholar and author; was born in Cork in 1843, and was educated at Queen's College there, and at Trinity College, Dublin. In 1867 he took, by competition, the professorship of oratory at Dublin University, which he exchanged soon after for that of English literature. He contributed many able articles to the leading magazines, and proved himself a profound Shakespearean scholar. Among his works were *Shakespeare: A Study of His Mind and Art* (1875), *Studies in Literature: 1789–1877* (1878), *Southey* (1879), in the English Men of Letters Series; and *Transcripts and Studies* (1888). In 1876 he published a volume of poems, and in 1888 a life of Shelley. He was secretary of the Irish Liberal Union.

DOWER, in the ordinary use of the term, is the estate which a widow takes in the lands or tenements of her husband for the support of herself and children. By the common law the widow was entitled to a life estate in one third of all the real property of which her husband was seised at any time during coverture, and which any issue she might have had could inherit. Dower is said to be inchoate when the conditions of marriage and the seisin of the husband exist, and consum-

mate upon the death of the husband. It is not necessary that the husband remain seised of real estate for any particular length of time, as the right of dower attaches instantly upon the seisin of the husband for his own use and benefit, and in order that he may give complete title in a conveyance of the property, it will be necessary that the wife join in the deed. The right of dower in the United States is largely regulated by statute in the various states, and the right is always determined by the laws of the state where the property is situated. In many states the right is now extended to personal property, and in some states the wife, upon the death of her husband, takes an absolute estate in fee-simple in her husband's realty. In many states where the estate which the husband took in his wife's property under the common law, called estate by the curtesy, has been abolished, the right of dower has been extended to the husband in his wife's estate in the same manner as her dower right exists in his estate. The manner in which the right of dower may be defeated or released is generally governed by statute. See also HUSBAND AND WIFE, Vol. XII, pp. 401, 402.

DOWLAIS, a town of Glamorganshire, southeastern Wales, on the Taff, and on the Brecon and Merthyr Tydfil and London and Northwestern railways. It is a suburb of Merthyr Tydfil, and is important for its extensive iron-works. Population, 16,807. See BELLOWS, Vol. III, p. 550.

DOWLAS, a kind of coarse, strong linen, used by working-people for shirts, and manufactured largely at Knaresborough, Yorkshire, England, at Dundee, and at Newburgh and other places in Fifeshire, Scotland.

DOWNIE, DAVID, an American missionary; born at Glasgow, Scotland, July 29, 1838; went to the United States in 1852, and graduated at Phillips Andover Academy in 1865, at Brown University in 1869, and at the Rochester Theological Seminary in 1872. He was sent as a missionary to Nellore, Madras presidency, India, with his wife, by the American Baptist Missionary Union, in 1873. He was very successful in increasing the scope and influence of the mission among the original natives of India, the Telugas, of Dravidian stock. Dr. Downie published a *History of the Teluga Mission* (1893).

DOWNIEVILLE, a town and the capital of Sierra County, northeastern California, 121 miles N.E. of Sacramento, on the Yuba River, surrounded by high mountains. It is a gold-mining and local trade center; in the vicinity are deep gravel hydraulic placer and quartz mines. About 12 miles E.N.E. is a peak called Downieville Butte, 8,800 feet above sea-level. Population 1895, about 800.

DOWNING, ANDREW JACKSON, an American landscape-gardener; born in Newburgh, New York, Oct. 31, 1815. He aided his brother in the nursery established by their father, and determined to be a landscape-gardener. In 1838 he built a mansion which he considered the true style of a country home, and soon became an authority on the embellishment of country places. In 1850 he visited England and wrote descriptions of its country seats, and on his return in 1851 was appointed to lay out the public grounds at Washington. He was engaged in this work when he sailed from his home in Newburgh in the steamer *Henry Clay*, which took fire on the Hudson River, New York, and he was drowned in his efforts to save other people, July 28, 1852. Mr. Downing published a *Treatise on the Theory and Practice of Landscape-Gardening* (1841); *Cottage Residences* (1842); and *Fruits and Fruit Trees of America* (1845). He was editor of the *Horticulturist*, a monthly magazine published in Albany, to which he contributed papers which were collected and issued as *Rural Essays* (1854).

DOWNINGTOWN, a railroad junction of Chester County, southeastern Pennsylvania, 32 miles W. of Philadelphia; on the Pennsylvania and Philadelphia and Reading railroads. It has a young ladies' academy, the Chester Valley Academy for boys, water-works, a limestone-quarry, and manufactures shoes, carriages, paper, woolen goods, stoves and machinery. Population 1890, 1,920.

DOWNS, THE. See SUSSEX, Vol. XXII, p. 723.

DOYLE, ARTHUR CONAN, grandson of John ("H. B.") Doyle (*post*, p. 1074), won fame in a kindred art as a popular novelist. Born in Edinburgh, May 22, 1859, he studied at Stonyhurst College and in Germany, returning to Edinburgh for a course of medical instruction. In his youth, short stories of his found their way into *Chambers's Journal*. A trip to the Arctic regions in a whaler preceded his medical graduation, when he spent four miserable months as surgeon on a passenger steamer plying between England and the west coast of Africa. Then for eight years he practiced medicine at Southsea, varying its monotony with his literary work. In his *Study in Scarlet*, written for *Beeton's Annual*, he created his best character, Sherlock Holmes. *The Firm of Girdlestone* (very much on the lines of Charles Reade's *Hard Cash*) and *Micah Clarke* (a novel of the western rising under Monmouth) followed, and fell in with popular favor. *The White Company*, a semi-historical novel similar to *Micah Clarke*, is esteemed by many as Dr. Doyle's best work. Then he wavered for a while between an oculist's career and the attractions of literature. Books prevailed, and Sherlock Holmes stalked through his "Adventures" and "Memoirs," sardonic, but a master of the science of deductive logic. Every boy in England and America dwelt lovingly on these detective stories, and admired Doyle's mingling of science with detective skill. He drew the bow too far, however, and many of the elders sighed with relief when he killed his much-exploited modern Vidocq. *Round the Red*

A. CONAN DOYLE.

Lamp, a collection of medical stories, and *The Stark-Munro Letters* still showed his bent for medicine and his skill in interweaving its details with his stories. Then he turned to the Napoleonic period and delighted many readers with the exploits of that *vieux soldat*, Brigadier Gerard. *Rodney Stone* (1896), a story of the Regency, once more approached the field of his former success in historical plots. His latest works are *Uncle Bernac* (1897); *The Tragedy of the Korosko* (1898); *Songs of Action* (poems, 1898); *Round the Fire* (1899). Dr. Doyle has lectured in America with considerable success.

DOYLE, Sir Francis Hastings Charles, an English poet; born at Nunappleton, near Tadcaster, Aug. 22, 1810. He was educated at Eton and Oxford, and took a first class in classics in 1831; and was elected a Fellow of All Souls, in 1832. He was called to the bar at the Inner Temple in 1837, but his devotion to poetry and his love of horses and horse-racing precluded his success as a barrister. He succeeded his father as a second baronet in 1839, and in 1867–77 filled the chair of poetry at Oxford. In 1868 he published his *Lectures on Poetry*, a second series appearing in 1877; and in 1886 his *Reminiscences and Opinions*, which revealed its author's genial humor, broad sympathies, and liberal culture. Died June 8, 1888.

DOYLE, Henry Edward, son of John Doyle, mentioned below; born in 1827, and educated for an artist. He soon became interested in art exhibitions. He represented Pope Pius IX in his contributions to the London Exhibition of 1862, and was rewarded with the order of knighthood of the Holy Roman Empire. In 1869 he was appointed director of the National Gallery of Ireland, and labored long and with much success to improve the collections of art in that country. He died in County Wicklow, Feb. 19, 1892.

DOYLE, John, a famous British caricaturist; born in Dublin in 1797. He learned his art in the schools of that city, went to London and essayed portrait-painting, exhibiting at the Royal Academy. He found lithography a more lucrative field, and soon won popularity and fame with his series of representations of prominent people. These were signed as the work of "H. B.," and the originals, now deposited in the British Museum, are well known as the "H. B." caricatures. He died Jan. 2, 1868.

DOYLE, Richard, son of John (the "Dicky" Doyle of *Punch*), was born in London in 1824. He was still more prominent in art, but more as an illustrator of marked talent than as a caricaturist. His early employment was on the staff of *Punch*, the familiar and facetious cover of which he designed. He withdrew from the paper in 1850, taking umbrage, as a Catholic, at the attacks upon Cardinal Wiseman and the papacy. Thenceforward his talents as a book-illustrator were persistent and abundant. He illustrated *The Newcomes* for Thackeray in 1853, but showed greater cleverness and a rare delicacy of touch in depicting the fantasies of fairy tales. Hunt's *Jar of Honey*, Ruskin's *King of the Golden River*, and Montalba's *Fairy Tales of All Nations* were interpreted by his facile pencil. He worked cleverly in water-colors, in which he exhibited at the Grosvenor Gallery. He died in London, Dec. 11, 1883, the object of sincere affection of a large circle of literary and artistic friends.

DOYLESTOWN, a borough and the capital of Bucks County, southeastern Pennsylvania, 25 miles N. of Philadelphia, on the Philadelphia and Reading railroad. It has two private academies, a public library, gas-works, water-works, and is a pleasant resort for summer visitors. It manufactures spokes and agricultural implements. Population 1890, 2,519.

DOZY, Reinhart, a learned German Orientalist; born in 1820, at Leyden. He studied at the university of his native city, and devoted himself especially to Oriental subjects. In 1844 he entered the Manuscripts Library, and in 1850 was appointed professor of history at Leyden. His fame rests chiefly on his valuable works on the history of Spain under the Moorish domination. His *Historie des Mussulmans d'Espagne* is a brilliant model of what a history should be, in style, arrangement and matter. He died April 29, 1883.

DRAA WADI, River. See Africa, Vol. I, p. 253.

DRACÆNA DRACO or DRAGON TREE. See Horticulture, Vol. XII, p. 266.

DRACHENFELS, a mountain in Rhenish Prussia, on the right bank of the river Rhine, about 8 miles S.E. of Bonn. Its name (Dragon's Rock) is from a legendary dragon which was supposed to inhabit a cave here, and this cave is pointed out now to the traveler. The mountain is of volcanic origin, consisting of lava, trachyte and basalt. It is covered with brushwood nearly to the top, which is crowned with a ruined castle, and whence the view is beautiful. It is celebrated in Byron's *Childe Harold's Pilgrimage:*

> "The castled crag of Drachenfels
> Frowns o'er the wide and winding Rhine."

DRACHM. See Apothecaries' Weight, in these Supplements; and for its symbol see Abbreviatory Signs, also in these Supplements.

DRACHMA. See Greece, Vol. XI, p. 89.

DRACHMANN, Holger Henrik Herholdt, a Danish poet; born at Copenhagen, Oct. 9, 1846. He studied art from 1866 to 1870, and began to paint marine pictures. In 1872 he published a selection of poems and one of sketches, and became a remarkably prolific writer in all departments of imaginative literature, both in prose and verse. Among his poems are *Repressed Melodies* (1875); *Songs by the Sea* (1877); *Vines and Roses* (1879); *Youth in Poetry and Song* (1879); *The Princess and Half the Kingdom* and *East of the Sun and West of the Moon*, both romantic poems, appearing, the former in 1878, and the latter in 1888. Among his longer prose writings are *En Overkomplet* (1876); and *Tannhäuser* (1877); and among his shorter writings, *Ungt Blod* (*Young Blood*), (1877); and *Paa Sömands Tro og Love* (*On a Sailor's Word*), (1878); and a series of sketches, *Derovar fra Graendsen* (*From the Frontier*), (1871). Drachmann belongs to the later school of Danish writers, whose aims are to depict character true to the stern realities of life.

DRACO, a constellation in the northern hemisphere. The star Draconis is celebrated as the one used in determining the co-efficient of aberration of the fixed stars.

DRACONTIUM, a tropical genus of plants of the family *Araceæ*. Like others of the family, it has strong medicinal properties; *D. polyphyllum* of Asia being used in asthma. *Dracontium* of medicine is obtained from another arum, the *Symplocarpus fœtidus*, or "skunk-cabbage," of the United States. Most arums emit an offensive odor from their inflorescences, which are composed of numerous flowers closely packed together on a fleshy axis, and enveloped by a hood-like spathe.

DRAFT, a tentative copy of a legal document or other formal writing, made for the purpose of adjusting the matter afterward to be admitted into the fair copy, or engrossed, as it is called. Manuscripts and proof-sheets are the drafts of printed works. A bill of exchange is called a draft. See Vol. III, p. 673.

DRAFT RIOTS, the outbreak which occurred in the summer of 1863 in the city of New York, upon the attempt to make the first draft under the Enrollment Act of March 3d of that year, which declared that all able-bodied male citizens of the United States, and all persons of foreign birth who had declared on oath their intention to become citizens, between the ages of eighteen and forty-five, should be liable to perform military duty, with some exceptions. In New York City, Provost-Marshal Jenkins and his deputies, who had received from the President requisitions calling for specified numbers of men, were instructed to commence operations, July 11th. There had been rumors of dissatisfaction, and as trouble was anticipated, the police were held in readiness. The day, Saturday, arrived, and, unexpectedly, the day's proceedings passed off pleasantly. Next morning the names of the conscripts appeared in the papers. In the neighborhood in which the initial working of the law was undertaken there resided a rather unruly element. Among them were many very poor men, heads of families, whose sole support they were, and who were, by the mere turn of a wheel, forced to leave home and family to the care of Providence. Such men began to reflect upon this phase of the conscription. Another cause for disapproval was the clause allowing the purchase, for three hundred dollars, of substitutes, which sum was far above what such poor men could raise. On the Monday following, committees of discontents went around the various places where laboring-men were engaged, enjoining them to fall into line with the various processions which were on their way to the place of conscription. Proceedings had barely commenced there, when a huge boulder crashed into the room, discomposing the serenity of the presiding officers. Immediately the mob was aroused, and the place was attacked and set on fire, which extended to the whole block, the fire brigade being prevented, by the force of the mob, from its attempts to reduce the flames. The city was in the power of the rioters, there being no troops at hand. The incendiaries, now increased tenfold, commenced plundering and fire-raising. Citizens were maltreated, and many were cruelly tortured to death. Private residences were looted and destroyed. A detachment of marines, about fifty in number, was sent on the street-cars to quell the mob, but could get no farther than Forty-third Street, the mob at Forty-sixth Street having torn up the rails at that point. The marines formed in line, and after an ineffectual appeal to the mob to disperse, they were fired upon by the marines, with blank cartridges. The mob was roused to fury, and before the marines could take any more effective means of dispersing the rioters, they were attacked and desperately maltreated. The police were also dealt with in the same way. The colored people in particular, and their sympathizers, were marked out for especially brutal treatment. The Colored Orphan Asylum was burned. Trade was paralyzed. A quorum of aldermen could not be collected to consider the situation. On Tuesday, Governor Seymour arrived and issued a proclamation, but it produced little effect, and the second day was even worse than the first. Not a store was opened. The murder of Colonel O'Brien, who had heroically attempted, single-handed, to pacify the mobs, was treacherous, inhuman and implacable. The arrival of the militia, that had been on duty in Pennsylvania, however, had the desired effect, and on Wednesday Mayor Opdyke was able to announce the quelling of the riot and the establishment of quietude. The mortality statistics for the week showed an increase of 450 over the figures for the corresponding week of the previous year, 90 deaths were reported as having been caused by gunshot-wounds, and about $1,300,000 were paid to claimants for damages.

In the following month the draft was resumed and completed without further trouble, President Lincoln, considering the draft urgent, refusing at that time to consider the petition of Governor Seymour to have the provisions of the act relaxed, or suspended, until its constitutionality could be determined.

DRAG-BAR, a bar or link for attaching carriages together, or to the motive power, as on railways.

DRAGOMAN. See GREECE, Vol. XI, p. 124.

DRAGON. See LIZARD, Vol. XIV, p. 736.

DRAGON, GREEN (*Dracunculus vulgaris*), a plant of the family *Araceæ*, which receives its name from the spotted stem. It is a native of southern Europe. Its flowers are black, remarkably fœtid, and give out exhalations which cause headache, giddiness and vomiting. The root is emetic, and, probably for no better reason than the peculiar appearance of the stem, has been supposed useful for curing serpent-bites. The name is also sometimes applied to *Arisæma Dracontium* of the United States.

DRAGONET (*Callionymus*), a genus of fishes of the goby family, remarkable for having the gill-

openings reduced to a small hole on each side of the nape, and the ventral fins placed under the throat, separate, and larger than the pectorals. They have no air-bladder. The species are pretty numerous; most of them finely colored, as the gemmæous dragonet (*Callionymus lyra*) of the British coasts—called *Gowdie* (*gowd*, gold) in Scotland—a fish about 10 or 12 inches long, the prevailing yellow color of which is varied with spots of sapphirine blue, etc. See GOBY, Vol. X, p. 714; and ICHTHYOLOGY, Vol. XII, p. 690.

DRAGONNADE. See CAMISARDS, Vol. IV, p. 743.

DRAGON-ROOT (*Arisæma* ; *Dracontium*), a plant of the family *Araceæ*, a native of North America, whose tuber is a powerful local irritant, and is used as a stimulant of the secretions in chronic bronchitis, asthma, rheumatism, etc. The powder, made into a paste with honey, is beneficially applied to the mouths and throats of children in aphthæ; and milk in which the root has been boiled is a useful ointment in cases of scald-head, ringworm, etc. The tuber is probably used interchangeably with that of the nearly allied and more common *A. triphyllum*, the common "Indian turnip."

DRAGON'S MOUTH (Span. *Boca del Drago*), the name of two straits or passages in the New World. One of them is in South America, separating Trinidad from the mainland, and connecting the Gulf of Paria with the southeast extremity of the Caribbean Sea. The other is in Central America, being on the northeast coast of Veragua, the most northwest portion of Colombia, between the Caribbean Sea and Lake Chiriqui.

DRAGOON-BIRD, a South American bird having the feathers on the head arranged in a helmet-like crest. It is also known as black fruit-crow, and umbrella-bird.

DRAINAGE. See SEWAGE, Vol. XXI, p. 713; and AGRICULTURE, Vol. I, pp. 328, 329.

DRAKE, CHARLES DANIEL, an American jurist; born at Cincinnati, April 11, 1811; a midshipman in the United States navy (1827–30); admitted to the bar in 1833; removed to St. Louis in 1834, and, entering politics, became United States Senator (1867–71), and chief justice of the United States court of claims (1871–85). He published *Law of Suits by Attachment in the United States* (2d ed., 1858); *Union and Antislavery Speeches* (1864); and edited *Pioneer Life in Kentucky*, a series of letters from Daniel Drake to his children (1870); and *Life of Dr. Daniel Drake* (1871). He died in Washington, D. C., April 1, 1892.

DRAKE, FRANCIS MARION, an American soldier and statesman; born in Rushville, Schuyler County, Illinois, Dec. 30, 1820. In 1859 he removed to Iowa. He served with distinction during the Civil War and was wounded at Mark's Mills, Arkansas, where he was left for dead. He was brevetted brigadier-general in February, 1865. After the war General Drake engaged in railroad projects, and was the first president of the Missouri, Iowa and Nebraska railway. He founded and endowed Drake University, at Des Moines. From boyhood the life of General Drake was an active and useful one. In 1895 he was elected governor of Iowa.

DRAKE, FRANCIS SAMUEL, an American author; born at Northwood, New Hampshire, Feb. 22, 1828. He was educated at the public schools and became a bookseller, and, following the steps of his father, Samuel Gardner Drake, devoted himself at the same time to antiquarian and historical researches. In 1872 he published a *Dictionary of American Biography, Including Men of the Times*, which gave, also, a key to assumed names. This work, with materials collected by the compiler for a new edition, was incorporated into *Appleton's Cyclopædia of American Biography*. He published some other biographies and town histories, and, also, *Tea Leaves* (1884) and *Indian History for Young Folks* (1884). He died at Washington, District of Columbia, Feb. 22, 1885.

DRAKE, JOSEPH RODMAN, an American poet; born in New York City, Aug. 7, 1795. His parents died while he was a boy, and he had to shift for himself. At first engaged in a business capacity, he soon abandoned it for the study of medicine. In 1812 he became connected with Fitz-Greene Halleck. His most inspiring poem, *The Culprit Fay*, was written in his twenty-second year. A volume of his collected verses was published by his daughter in 1835. His best-known composition is the address to *The American Flag*, for which Halleck furnished the four concluding lines. He died in New York City, Sept. 21, 1820.

DRAKE, SAMUEL GARDNER, an American antiquarian; born at Pittsfield, New Hampshire, Oct. 11, 1798. He was educated at the public school, and at the age of twenty he became a public-school teacher. He went to Boston in 1828, opened the first antiquarian bookstore in the United States, and republished Captain Church's *Entertaining History of King Philip's War*. He was a founder of the New England Historic Genealogical Society, of which he was made president in 1858. He resided in London for two years. He edited some New England works and published many books on historical and antiquarian subjects, including an *Indian Biography* (1832); *Book of the Indians* (1833), often republished; *Old Indian Chronicles* (1836); *Indian Captivities* (1839); *Drake Family* (1845); *History and Antiquities of Boston* (1856); *Researches Among the British Archives* (1860); *Memoir of Sir Walter Raleigh* (1862); *Annals of Witchcraft in the United States* (1869); and the *History of the Five Years' French and Indian War* (1870). He died in Boston, Massachusetts, June 14, 1875.

DRAKENBERG MOUNTAINS. See NATAL, Vol. XVI, p. 240.

DRAMA, THE AMERICAN. The first theatrical performances in North America were given in Quebec, in 1694, by amateur players, although there is little doubt that the Spaniards in Mexico had established the stage, which, in the times of the Spanish invasions, was in the height of its

glory in the mother-country. The next positive date was 1745, when the first English performances were given in the island of Jamaica, and so successfully that the leader, Moody, famous as an actor of Irish characters, went to England, and in the following year brought out a regular company of actors, returning to Jamaica, where he remained for many months.

The first performance of an English play in what is now the United States was in Boston, in 1749, when Otway's *Orphan* was acted, but received by the Puritans with such horror that at the next general court a law was passed, fining actors, as well as spectators, £5 ($25) apiece, and the owner of a building £20 ($100), "for each and every day or time" a play was attempted or permitted. This law was enforced for nearly fifty years. In 1749 an attempt was also made to open a theater in Philadelphia, but the parties were arrested and bound over to their good behavior. They went to New York, and in February, 1750, rented a convenient room on Nassau Street, where they opened, on the 5th of March following, with a play announced as *The Historical Tragedy of King Richard III.* "Wrote originally by Shakespeare, and altered by Colley Cibber, Esq." The season lasted 16 months, with the exception of six weeks in the summer of 1750. The managers and chief actors were Murray and Kean. In July, 1750, the company disbanded, but the remains were gathered together by a Mr. Upton. The following season does not seem to have been very successful, as it was brought to a close in February, 1751.

Moody's success in Jamaica caused him to return to England in 1749, when he was at once engaged by David Garrick for Drury Lane. The rumors of his exploits had spread in London, and caused Mr. and Mrs. Lewis Hallam to organize a company, and with a stock of scenery and costumes from the Goodman Fields Theatre, they came to America, went to Williamsburg (then the capital of Virginia), altered an old storehouse over into a theater, and opened it, Sept. 5, 1752, with the *Merchant of Venice* and Garrick's farce, *Lethe.* The reception they received was very different from that accorded their friends in Boston and Philadelphia. Governor Dinwiddie gave them a certificate, drawn up and signed in council, testifying in high terms as to their ability as comedians, as well as to their conduct as men. They went to Annapolis, Maryland, and acted in the first regular theater erected in the colonies. In June, 1753, they went to New York, but met with unexpected opposition, through the abuse of a trust reposed in their advance agent. Mr. Hallam pleaded his case in the public press, and appealed to the authorities, with ultimate success. A prosperous season of six months followed, when they went to Philadelphia, where they met the most determined opposition. Petitions and counter-petitions were signed, and the city was divided in the dispute. Permission was at last obtained for the presentation of 24 plays, on the condition that the players "offered nothing indecent or immoral." The season was so satisfactory and successful that six more nights were added. Mr. Hallam then went to the West Indies, where he died. A Mr. Douglass led the actors back to New York, and built a theater on Cruger's wharf, the Nassau Street theater having been converted into a church.

In the spring of 1759 Mr. Douglass went to Philadelphia, where he built the first regular theater erected in that city. Shortly after, a theater was built in Newport, Rhode Island, where the first performance by professional actors was given in the New England states, on Sept. 7, 1761. In 1762 the company went to Providence, and in that year was formed the first theatrical circuit. It began at Williamsburg, Virginia, and included Annapolis, Philadelphia, New York, Newport, Providence, and a few smaller places, where a courthouse or proper building might serve the purpose of a theater. In New York a new theater was built in Chapel Street, and was, during one of the disturbances caused by the Stamp Act, the scene of the first theatrical riot. During the succeeding ten years several other theaters were built, but on Oct. 24, 1774, the Continental Congress recommended a suspension of all public amusements. Douglass, who had been fairly successful, was obliged to yield, and took his company to the West Indies, where he had been always welcome.

During the Revolutionary struggle there were no theatricals, except those given by British officers. A remarkable incident brought these to an end. Burgoyne, the British commander, wrote a play, *The Blockade of Boston*, and while it was being played a sergeant dashed in and announced, "The rebels have attacked the lines on the Neck" (the "Neck" was a strip of land connecting Boston with the mainland). The audience applauded his spirited delivery, and it was some minutes before the truth of his statement was realized. The play ended without completion; the British were driven from Boston and went to New York, where they took possession of the John Street Theater, which they called the Theater Royal. Major André was among the chief actors.

After the war the players came back. Up to 1794 there was in the United States but one stock company of recognized merit. After this date the growth of the drama was marked for its rapid development. Owing to prejudice, which had not yet subsided, various efforts to avoid the rigid laws were adopted. As late as 1792 a play-bill announced "A Moral Lecture in Five Parts, in Which the Dreadful Effects of Conspiracy will be Exemplified." It was but an underhand way of advertising Otway's *Venice Preserved. Hamlet* and *Romeo and Juliet* were also given as "moral lectures" or "moral dialogues." Such a violation of the law could not last long, and in December, 1792, the "exhibition rooms" were closed. Fortunately, in 1793, the legislature of Massachusetts repealed the law against theaters, and in February, 1794, the Federal Street Theater

was opened with a prologue by Robert Treat Paine, Jr.

In New Orleans the first performances seem to have been given in 1791, by a company who had escaped from the insurrectionary troubles in Santo Domingo. The first theater in the Crescent City seems to have been built about 1808, and in 1822 the first American theater in New Orleans was built. A brick theater was built in Natchez, Mississippi, in 1828. From the beginning of the century the drama prospered, and kept pace with the growth of the country.

The first play written and acted in America seems to have been Burgoyne's *Blockade of Boston*, already referred to. The first professional dramatist in the United States was William Dunlap, one of the most fertile of playmakers. He was one of the founders of the National Academy of Design, and the author of several works. His *History of the American Theater* is an invaluable authority.

John D. Burke, killed in a duel in 1808, was the successful author of the plays *Bunker Hill; or, The Death of General Warren; Joan of Arc;* and several others. Other actors and authors followed; among them, John Howard Payne, the author of *Home, Sweet Home.* He is credited with some sixteen plays. Samuel Woodworth, the author of *The Old Oaken Bucket*, was also the writer of successful plays. George P. Morris, the author of *Woodman, Spare That Tree*, produced *Briercliff*, which held the stage for years.

The first actor to "star" was Cooper. He attached himself to no company, but went from one theatrical point to another, playing the chief part. The first great actor to follow him was George Frederick Cooke, who died in 1812. In 1820 Edmund Kean appeared as Richard III in New York. After filling his New York engagement he went to Boston; but one night, there being a sparse audience, he refused to act, and left the country. Five years later he returned and appeared in New York, but the memory of his slight to the Boston audience was not dim, and one of the worst riots known in theatrical history was the result. Kean apologized, and filled his engagement, but when he went to Boston, another riot occurred, which resulted in the destruction of the greater part of the theater.

In 1821 Junius Brutus Booth appeared as Richard III in Richmond, Virginia, then went to New York. He was immediately acknowledged as a master, and no actor exerted so much influence on acting in America as he. He died in 1852, four days after he had played in New Orleans, and while on his way to Cincinnati. Edwin Forrest was, if not the equal of Booth, at least a fit successor. He began playing in 1820, when but 14 years of age. At 19 he was the leading actor at the Albany Theater, and at the age of 20 made his appearance at the New York Park. In 1848, while in England, he became involved in a trouble with Macready, which culminated in the Astor Place riot, in New York, in 1849.

Macready, although 13 years older than Forrest, did not appear on the stage until 1826. Mrs. Duff made her first appearance in 1810 as Juliet, and while on the stage, a period of 28 years, was regarded as the foremost actress in America. In 1838 she left the theater and went into a self-imposed retirement, having taken upon herself a religious life. Fanny Kemble was another brilliant star. She was hailed as a beauty as well as a genius, and during her time she had none to dispute her place or sway. She left the stage in 1834 and married. Several plays came from her pen, the best known being *Francis the First.* Charlotte Cushman began as a singer, and was for a time prima donna at New Orleans, but, the climate affecting her voice, she gave up singing and became an actress. Her influence did much to elevate the stage and break down Puritanical prejudice.

Charles Mathews, whose eccentric comedy was as highly esteemed in England as Kemble's light comedy, first appeared in America in 1822. His trip was profitable and he returned to England. In a play written by himself, and acted in London, called *Mathews in America*, there were many caricatures which gave great offense to the sensitive Americans, and were not readily forgiven. His son, Charles James, usually known as Charles Mathews "the younger," appeared in 1834. He was a comedian of extraordinary lightness and ease, and his influence on the younger generation still survives.

The drama had grown to large proportions, and each succeeding year witnessed the advent of brilliant geniuses. In 1826 James H. Hackett, the first to make a specialty of Yankee parts, went on the stage. He journeyed to England, and introduced the stage Yankee to the English public with great success. Hackett was probably the earliest performer of *Rip Van Winkle.* He repeated his visit to England, when George Handel Hill became the favorite as a delineator of Yankee character. Hill followed to England, and even went to Paris, but the Parisians failed to appreciate his *Solomon Swop*, and but a few performances were given.

Dan Marble, as Sam Patch, appeared in 1838. F. S. Chanfrau, in *Mose, the New York Fireman*, and later, in *Kit, the Arkansas Traveler*, achieved a remarkable success. Joseph Jefferson, in *Our American Cousin*, and later in *Rip Van Winkle*, became noted for ease and simplicity of method, and for more than twenty years his *Rip Van Winkle* has held the stage. The play, as given by Hackett, was rewritten at the request of Jefferson, by Dion Boucicault, with suggestions and emendations by Jefferson, and has proved one of the most remarkable successes on the American stage.

With the increase in the number of stars, it began to be difficult to get a good stock company together. At first, stars acted only on special nights, but for personal profit eventually were willing to act every night. Then the star, seeing that the manager relied on him or her to get people into the house, demanded the lion's share of the profits.

In the latter part of the history of the American drama the array of prominent names is very large. James W. Wallack, the handsome, dashing actor, gentlemanly and popular in the best and most refined society; William E. Burton, perhaps the best actor of broad, low-comedy parts; John Brougham, the genial Irish-American actor and author; John Lester Wallack; Augustin Daly; Edwin Booth, son of Junius Brutus Booth, and heir of much, if not all, of his histrionic genius; Dion Boucicault, and scores of others, have made the American stage one of the great social forces.

The number of theaters and opera-houses in the United States is about 3,100; of actors, actresses, and professional singers actively employed, 5,127; of professional itinerant theatrical, operatic, and musical "attractions," 347. See also DRAMA, Vol. VII., pp. 391–444.

DRAMMEN, a seaport town in Jarlsberg and Larvik province, Norway; has a college and various factories, and does a large trade in timber, iron, and pitch. Population 1891, 20,687.

DRANESVILLE, a village of Fairfax Co., Va., 17 miles N.W. of Washington, the scene of a battle between the Union and the Confederate troops, Dec. 20, 1861, in which the Federals gained a slight advantage.

DRAPER, ANDREW SLOAN, an American educator; born at Westford, New York, June 21, 1848; studied law at Union University, Schenectady, New York, and practiced in Albany, New York (1871–84); was a member of the New York assembly (1881), and a judge of United States Court of *Alabama* Claims (1884–86). His educational offices include, member of the school board of Albany (1878–81); superintendent of public instruction in New York (1886–92); superintendent of schools at Cleveland (1892–94); and regent of the University of Illinois (1894). He received the degree of LL.D. from Colgate University in 1890. He is the author of numerous works bearing on the educational problem, including, *What Ought the Common Schools to Do? How Can It Be Done?* (1886); *The Powers and Obligations of Teachers* (1887); *A Teaching Profession* (1890); *The Authority of the State in the Education of Her Children* (1890); *The Responsibility and Authority of Trustees* (1891); *American Schools and American Citizenship* (1891).

HENRY DRAPER.

DRAPER, HENRY, physicist, son of John William Draper; born in Prince Edward Co., Va., March 7, 1837. In 1858 he graduated at the medical department of the University of New York; became professor of physiology there in 1860, professor of analytical chemistry and physiology in the scientific department, and finally dean of the medical faculty. He early published a thesis on the *Changes of Blood-Cells in the Spleen*, and served for a time on the medical staff of Bellevue Hospital. Taking up his residence, after a visit to Europe, at Hastings-on-the-Hudson, he built an observatory there, and became noted for his labors in celestial photography, and for his original researches in chemistry and many important observations in astronomy. The photographic and spectroscopic examination of the moon and other heavenly bodies especially interested him, and secured for him, in 1874, the appointment, by Congress, to superintend the photographic department of the commission authorized to observe the transit of Venus in that year. In 1866 he published a *Textbook of Chemistry*, and previously issued a brochure *On the Construction of a Silvered-Glass Telescope*. In 1877 he announced the discovery of oxygen in the sun by photography, and a new theory of the solar spectrum. He made many interesting contributions to the *American Journal of Science*, and collected and exhibited a vast number of photographs of celestial phenomena. He died in New York, Nov. 20, 1882.

DRAPER, JOHN CHRISTOPHER, an American chemist, son of Dr. John William Draper; born in Prince Edward County, Virginia, March 31, 1835; graduated in the medical department of the University of New York in 1857; and was professor of analytical chemistry in that institution from 1858 to 1871; and professor of chemistry in Cooper Union from 1860 to 1863; professor of natural science in the college of the city of New York in 1863; and of chemistry in the medical department of the University of New York (1866). He published *Anatomy, Physiology and Hygiene* (1866); *A Practical Laboratory Course in Medical Chemistry* (1882); *A Textbook of Medical Physics* (London, 1885); and edited *Year Book of Nature and Popular Science* (1873). He died at New York City, Dec. 20, 1885.

DRAPER, JOHN WILLIAM, an American physicist and historian, was born at St. Helen's, near Liverpool, England, May 5, 1811. His father was a Wesleyan clergyman, and young Draper was educated at a school conducted by the sect, and took a course in chemistry at the University of London, where he developed a fondness for science. In 1832 he emigrated to the United States, and settled for a time in Virginia, graduating in 1836 at the medical department of the University of Pennsylvania. In the same year he was called to the chair of chemistry and natural philosophy in Hampden-Sidney College, Virginia, and two years later became professor of chemistry in the medical department of the University of New York, and in 1840 succeeded to the presidency of the medical college, which he held until 1873. His experimental investigations and many discoveries in chemistry brought him into prominence among scientists, and gained him, in 1875, the Rumford medal from the American Academy of Science. His researches into the chemical phenomena of light early bore fruit, while Daguerre's discovery of the action of sunlight on silver directed his attention to photography, and led him to produce the first photographic portrait from life, and the first photographic representation

of the moon's surface. He early interested himself also, in electricity, and made many important contributions in prismatic and spectrum analysis, and was the first to photograph the diffraction spectrum. He was the first president of the American Chemical Society, and became a member of many learned societies in Europe. His published writings include a treatise on *The Forces that Produce the Organization of Plants* (1844); textbooks on *Chemistry, Natural Philosophy* and *Human Physiology, Statical and Dynamical* (1856); *Scientific Memoirs*, being experimental contributions to a knowledge of radiant energy (1878); *History of the Intellectual Development of Europe* (1862; 2d ed. 1876, in 2 vols.), which gained for its author the commendation of Professor Tyndall in his famous Belfast address, and a place on the "Index Expurgatorius"; *Thoughts on the Future Civil Policy of America* (1865); *History of the American Civil War* (3 vols., 1867–70); and a *History of the Conflict between Religion and Science.* He died at Hastings-on-the-Hudson, New York, Jan. 4, 1882.

DRAPER, Lyman Copeland, an American antiquarian and historian; born in Hamburg (now Evans), N. Y., Sept. 4, 1815. In 1838 he began to interview Western pioneers, thus collecting valuable historical information. In 1853 he went to Madison, Wis.; in 1858–60 was state superintendent of instruction; and became corresponding secretary of the Wisconsin Historical Society, and in 1887 he was appointed honorary secretary for life. He published *Collections* of the State Historical Society (10 vols., 1853–87); *Madison, the Capital of Wisconsin* (1857); *King's Mountain and Its Heroes* (1881). He died in Madison, Wis., Aug. 26, 1891.

DRAPER, William Henry, an American physician; born at Brattleboro, Vermont, Oct. 14, 1830. He studied at Columbia College, New York City, and also in Paris and London. In 1869 he became clinical professor of diseases of the eye and ear in the College of Physicians and Surgeons, and in 1880 was appointed professor of clinical medicine. In 1886 he became president of the New York Academy of Medicine.

DRAUGHT or DRAUGHT OF WATER, in maritime affairs, a technical name for the depth to which a ship sinks in the water when fairly afloat. The draught is marked on the stem or stern-post, or both, from the keel upward. When a ship is in good trim, the draught does not differ much at the two ends. Ships with sharp bottoms draw more water, or have a greater draught, than those of flatter construction.

DRAUGHTSMAN. A draughtsman differs from a designer, inasmuch as he lays no claim, in that capacity at all events, to the character of an originator.

DRAVE (Ger., *Drau*), a river of Austria. It rises in the Tyrol and flows eastward, turning slightly toward the south, and joins the Danube a few miles east of Essek. The valleys through which it flows in its course through Carinthia, Styria and Croatia are distinguished for great fertility and picturesque scenery, while the population upon its banks is numerous and industrious. In Slavonia the Drave is frequently bordered by dense forests. It is nearly four hundred miles in length, and is navigable for over half that distance.

DRAVIDIAN LANGUAGES and LITERATURE. See India, Vol. XII, pp. 777, 778; Philology, Vol. XVIII, p. 779; and Tamils, Vol. XXIII, pp. 42–45.

DRAWBACK, a term in commerce, employed in connection with the remitting or paying back of excise duties on certain classes of articles exported. Excise duties, as a matter of course, enhance by so much the natural price of the commodity on which they are imposed. Were these duties not remitted, the commodity so taxed would not be ordered from those foreign countries where articles of the same kind could be purchased free of such duties. To afford facility for the exportation of these articles, the state resorts to the expedient of returning to the exporter a sum equal in amount to what he or the manufacturer had paid to the excise.

DRAW–BAR or DRAW–HEAD, in railway mechanics, a buffer to which a coupling is attached.

DRAWING–BOARD, a board on which drawing-paper is strained for painting on in water-colors. The paper is wetted for the purpose of being strained, and when attached at the edges it is permitted to dry and contract. Formerly, the drawing-board was fitted into a frame, the edges of the wet paper being made fast by the pressure of the frame on the board. But the much simpler drawing-board which is now in use is made of a flat piece or pieces of wood, held together and prevented from warping by an edging of other pieces, the grain of which runs in the opposite direction. The wet paper is attached to the board with paste or thin glue, and when dry becomes perfectly firm and flat. When the work is finished, the paper is cut beyond the drawing with a knife.

DRAW–PLATE, a steel plate with a graduated series of holes, through which metals are drawn in making them into wires or bars. Also a name given to a plate of metal placed before a fire or before the lateral opening between the top of the fireplace and the throat of the chimney. Its use is to force the air to pass through the fire on its way into the chimney, instead of allowing it to pass over the fire.

DRAYTON, William Henry, an American statesman; born at Drayton Hall, on Ashley River, South Carolina, in September, 1742. He was educated in England, at Westminster School and Balliol College, Oxford, and, after his return to the United States, studied law, was admitted to the bar, and became an active writer on political topics. He opposed the patriotic associations in the colonies, and in 1771 received from the king the appointment of privy councilor for the province of South Carolina. As the revolutionary crisis approached, however, his sentiments changed, and he was suspended from his offices under the crown. In 1775 he became a member

of the Council of Safety, of which he was soon after made president; was president of the Provisional Congress in 1775; privy councilor and chief justice of the state; and in 1778 was elected a delegate to the Continental Congress, of which he continued to be a member till his death. He left a record of the events of the Revolution, which was published in 1821, under the title of *Memoirs of the American Revolution.* He died in Philadelphia, Sept. 3, 1779.

DRAYTON-IN-HALES OR MARKET DRAYTON, a town in the northeast of Shropshire, western central England. It is an old town, on the banks of the Fern, 19 miles N.N.E. of Shrewsbury and 153 miles N.W. of London. It is supposed to be the *Caer-Draithon* of the Romans. Here, in 1459, the Yorkists defeated the Lancastrians with great loss. The parish church was built in the reign of King Stephen. Drayton has manufactures of paper and haircloth, markets during the week and several fairs during the year. Population, 4,039, chiefly agricultural.

DREDGING-MACHINE. See STEAM-SHOVELS AND DREDGES, in these Supplements.

DRED SCOTT CASE. See UNITED STATES, Vol. XXIII, p. 772.

DREIBUND, THE, is the league or compact formed between Germany, Austria and Italy for mutual defense in case of attack. In 1579 an alliance between Germany and Austria, known as the "dual alliance," was formed, and in 1882, on the addition of Italy to the agreement, the dual alliance became the dreibund. The alliance has been maintained since, Emperor William of Germany announcing, in 1891, that it had then been resumed for a period of six years. The relation of these powers makes this dreibund an important safeguard in the maintenance of a balance of power on the continent of Europe.

DREISSENA. See MOLLUSCA, Vol. XVI, p. 689.

DRESDEN, a town of Bothwell County, western Ontario, on the east branch of the Sydenham River, at the head of navigation, and on the Erie and Huron railroad. Its industries are stave, timber and lumber cutting, ship-building and fruit-canning. Population 1891, 2,058.

DANIEL DREW.

DRESDEN, BATTLE OF. See NAPOLEON, Vol. XVII, p. 220.

DRESS. See COSTUME, Vol. VI, pp. 453–478.

DRESSINGS, in architecture, a term loosely used to signify moldings and all the simpler kinds of sculptured decorations.

DREW, DANIEL, an American capitalist; born in Carmel, New York, July 29, 1797; died in New York City, Sept. 19, 1879. He was first a cattle-drover, then engaged in steamboat-building, and afterward was connected with railroad enterprises, becoming a prominent speculator in Wall Street. He amassed a fortune, which at one time was estimated variously at from five to fifteen million dollars, but afterward lost heavily and ultimately was compelled to go into bankruptcy. Mr. Drew founded the Drew Ladies' Seminary at Carmel, gave large sums to Wesleyan University, Middletown, Connecticut, and in 1866 gave $250,000 toward founding the DREW THEOLOGICAL SEMINARY of Madison, New Jersey, the sum being afterward increased by him to nearly $1,000,000. This institution was founded for the purpose of training young men for the Methodist Episcopal ministry. It was opened Nov. 6, 1867, the first president being the Rev. Dr. John McClintock. The course extends to three years, and is adapted to college graduates. There are two scholarships for advanced students, permitting the pupil to study abroad if desired. The direction and control of the faculty, etc., are under the supervision of the General Conference of the Methodist Episcopal Church.

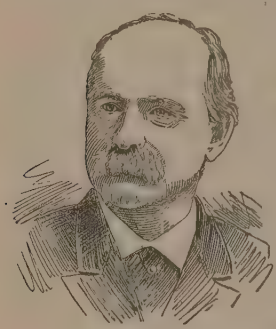
DREW, JOHN, an American actor; born at Dublin, Ireland, Sept. 3, 1825. He removed to the United States when a youth, and made his first appearance as an actor at the Bowery Theater, New York City, in 1845, as Dr. O'Toole in *The Irish Tutor.* He removed to Philadelphia, and there became a favorite, and that city has been the home of the family since. He appeared for the first time in Philadelphia, Aug. 28, 1852, as Trapanti in *She Would and She Would Not.* In the following year he assumed the management of the Arch Street Theater, in association with William Wheatley. He afterward toured in England (1855), California (1858), and Australia (1859). His last appearance on the stage was made May 9, 1862, on his return from Australia. He died in Philadelphia, May 21 1862.

DREW, JOHN, an American actor, son of John Drew and Mrs. John (Louisa) Drew; born in Philadelphia, Nov. 13, 1853, and made his first appearance at the Arch Street Theater, March 22, 1872, as Plumper, in *Cool as a Cucumber.* Feb. 17, 1875, he appeared at the Fifth Avenue Theater, New York City, as Bob Ruggles in *The Big Bonanza.* He subsequently appeared at the same theater with Edwin Booth in Shakespearean plays, and during the season of 1878–79 played Henry Beauclerc in *Diplomacy.* On the new Daly Theater being opened in 1880, Drew was one of the members of the new company, remaining with it until 1892, during which period he visited Europe, taking a leading and an originating part in the plays produced. At the commencement of the season of 1892 he began to star on his own account.

DREW, LOUISA (LANE), an American actress and manager; born in London, England, Jan. 10, 1820, the daughter of an English actor named Lane. She came to America with her mother when eight years old, and soon appeared in child's parts in New York and Philadelphia. She was taken on a tour to Jamaica and the West Indies soon afterward, from which she returned

in 1832. At the age of 14 she appeared as Julia, in *The Hunchback*, at the Boston Theater. For several years afterward she performed in various cities in dramas, burlesques and light comedies, extending her tour in 1847 to Chicago, St. Louis, New Orleans and Mobile. In 1848 she married George Mossop, an Irish comedian, who died a few months later. In 1849 she married John Drew, with whom she went on a starring tour in 1857, whence dated the beginning of her fame as an actress. In 1861 she assumed the management of the Arch Street Theater, in Philadelphia, where, for many years, she exercised an able control. In high comedy parts she was without a rival on the American stage. In 1888–89, when Joseph Jefferson and W. J. Florence formed a combination of stars to perform *The Rivals* in the principal theaters of the country, Mrs. Drew shared the honors of the tours with Jefferson and Florence. Died in Larchmont, N. Y., Aug. 31, 1897.

DREXEL, ANTHONY JOSEPH, head of the great banking firm of Drexel, Morgan and Company, of Philadelphia, New York, and London, was born in Philadelphia in 1826. On the death of his father in 1863, Anthony Joseph and his brother Francis succeeded to the management, and at once greatly extended the scope of the business, establishing branches in New York, London and Paris. In 1876 the Drexels united with the Rothschilds and others in forming a syndicate which placed on the market three hundred million dollars for the United States government in 4½ per cent bonds. Two years later the same parties placed fifty million dollars more bonds. The firm also negotiated loans for and purchased large blocks of stock of various railroads, etc. Mr. Drexel was a man of magnificent benefactions. Among them are the Drexel Institute in Philadelphia, and, in connection with George W. Childs, the Childs-Drexel Home for Aged Printers, at Colorado Springs, Colorado, the latter dedicated May 12, 1892. The Drexel Institute of art, science and industry, for both sexes, was dedicated Dec. 17, 1891. The land and buildings cost $550,000, and the founder gave the institution $1,000,000 for endowments. He bequeathed $1,000,000 to trustees to pay $100,000 to the German Hospital in Philadelphia, the income of the remainder to be used for the erection of an art gallery, museum or other public building in connection with the Drexel Institute; and in case the projected gallery or museum should not require the whole income, to use the surplus for the establishment of a Drexel hospital. The estimate of Mr. Drexel's estate was between $25,000,000 and $30,000,000. He died June 30, 1893, at Carlsbad, Bohemia.



ANTHONY J. DREXEL.

DREYER, JOHN LOUIS EMIL, a Danish astronomer; born in 1852 at Copenhagen. M.A. and Ph.D. of Copenhagen University. He was astronomer at the Earl of Rosse's Observatory, Birr Castle, 1874; assistant astronomer at the Observatory of Trinity College, Dublin, 1878; director of Armagh Observatory, 1882; and was the author of *Second Armagh Catalogue of 3,300 Stars for 1875, from Observations Made in the Years 1869–83* (1886); *A New General Catalogue of Nebulæ and Clusters of Stars* (1888); *Tycho Brahe: A Picture of Scientific Life and Work in the Sixteenth Century* (1890); and various papers on astronomical and other scientific subjects.

DRIFT, a name given to the boulder-clay, a deposit of the Pleistocene epoch. More fully, it is called the Northern Drift, Glacial Drift or Diluvial Drift, in allusion to its origin. Driftwood is wood carried by tides and currents to a distance from its native locality. Specimens thus transported have been observed in the marine strata of the chalk, London clay and other formations. Sand-drift is sand driven and accumulated by the wind. See GEOLOGY, Vol. X, pp. 365–368.

DRIFT, in mechanics, a conical hand-tool of steel for enlarging or shaping a hole in metal, by being driven through or into it.

DRIFT, in navigation, a technical name for the deviation which a ship's course receives by the action of a contrary wind or currents.

DRILL–BABOON. See MANDRILL, Vol. XV, pp. 476, 477.

DRILL–PRESSES. See MACHINE TOOLS, in these Supplements.

DRILLS, tools for boring holes in metals. See MACHINE TOOLS, Vol. XV, pp. 155, 156.

DRILLS, implements for sowing grain. Machines have long been used for sowing grain. The object of the "drill" is to deposit seed in the ground in rows and then cover it. In this method of seeding, great advances have been made since colonial times. About the time of the adoption of the United States patent law the mechanical drill began to take practical form in England (for description of English drills, see AGRICULTURE, Vol. I, p. 320). The first successful grain-drill in the United States was invented in 1837 by Moses Pennock of Chester County, Pennsylvania, and patented by him in March, 1841. It was improved by his son, and in 1853 received the highest award at the International Exhibition in New York. Many forms of the grain-drill are now in use, over 5,000 patents for this machine having been issued in the United States alone. It has been developed in the United States and Great Britain to a high state of perfection.

DRINK QUESTION, THE. See LIQUOR LAWS, in these Supplements.

DRISLER, HENRY, an American scholar; born on Staten Island, New York, Dec. 27, 1818, and graduated at Columbia in 1839, in which college he was appointed tutor in Greek and Latin in 1843, adjunct professor of the same in 1845, professor of Latin in 1857, and of Greek in 1867,

on the death of Dr. Anthon. He prepared a new edition, with additions, of Liddell and Scott's adaptation of Passow's *Greek Lexicon*, in conjunction with Dr. Anthon (1846), and was associate editor of the seventh Oxford edition of Liddell and Scott (1883); and prepared a greatly enlarged edition of Yonge's English-Greek Lexicon (1870). He died in New York city, Nov. 30, 1897.

DRIVER, SAMUEL ROLLES, an English educator and author; born in 1846, educated at Oxford, of which he was elected scholar in 1865, and graduated with first-class honors in 1869; fellow of New College from 1870 to 1882, and tutor from 1875 to 1882. He applied himself early to the study of Hebrew and other Semitic languages, and obtained the two University Hebrew scholarships in 1866 and 1870, respectively, and was appointed, in 1875, member of the Old Testament Revision Company. In 1882 he was appointed to the regius professorship of Hebrew at Oxford (with a canonry of Christ Church attached). He wrote *A Treatise on the Use of the Tenses in Hebrew* (1874); *Isaiah: His Life and Times, and the Writings Which Bear His Name* (1888); *Notes on the Hebrew Text of the Books of Samuel* (1890); and of various articles relating to the Old Testament and Hebrew philology; and was also the joint editor of *The Holy Bible, With Various Renderings and Readings from the Best Authorities*, published by the Queen's printers in 1889. As a Hebraist and student of the Old Testament, he established a reputation upon the Continent and in America.

DRIVING. In the United States, furious driving in cities generally is a misdemeanor, punishable by fine and imprisonment. In the absence of state laws, municipalities regulate the rate of driving.

DROIT D'AUBAINE. See ALIEN, Vol. I, p. 575.

DRÖLLING, MICHAEL MARTIN, a French painter; born at Paris, March 7, 1786; son of Martin Drölling, under whose instruction and that of David he studied. He won the grand prix de Rome and became a member of the French Institute in 1833. Among his paintings are *The Wrath of Achilles* (1810) and *Orpheus and Eurydice* (1817). He received the decoration of the Legion of Honor in 1837 and died in Paris, Jan. 9, 1851.

DRONGO-SHRIKE, the birds of the family *Dicruridæ*, found in Asia, Africa and Australia. They are glossy black in color. In India they are called king-crows, because they so successfully attack intruders, as crows or kites.

DROMORE, a town in the northwest of Down County, Ireland, on the Lagan, 17 miles S.W. of Belfast by rail. It is noted for its linen manufactures and as the burial-place of Jeremy Taylor. Population, 2,408.

DROSCHKY OR DROSHKY, a term applied to a form of carriage in use in Russia and Germany, very much like the English victoria. Formerly, as first used in Russia, it was a four-wheeled vehicle in which the passengers rode astride a bench, their feet resting on bars near the ground. It had no top. The modern droshky is a public hack or cab, and the word is used freely of any public conveyance.

DROSERACEÆ. See INSECTIVOROUS PLANTS, Vol. XIII, pp. 134, 140.

DROSOMETER, an instrument for measuring the quantity of dew that collects on a surface exposed to the open air during the night. The simplest drosometer is a tussock of wool, weighed when dry, and again after the accession of dew. The general form is that of a balance, the portion for the weight protected, while the other side is left exposed so as to collect the dew.

DROUYN DE LHUYS, ÉDOUARD, a French statesman; born in Paris, Nov. 19, 1805. He was attached to the embassies at Madrid and at The Hague. In 1840 he was placed at the head of the commercial department under the Minister of Foreign Affairs, and shortly afterward was elected deputy for Melun. Under Louis Napoleon's presidency in 1848, he became Minister of Foreign Affairs, and in 1849 went to London as ambassador. He again took office as Minister of Foreign Affairs in 1852, and remained in office until 1855. For the third time he was Foreign Minister from 1862 to 1866. From 1866 to 1870 he was a member of the Privy Council, but after that year took no further part in politics. He died in Paris, March 1, 1881.

DROUN, THOMAS MESSINGER, an American chemist; born in Philadelphia, Pennsylvania, March 19, 1842. On his graduation from the University of Pennsylvania Medical School in 1862 he went to Germany, where he studied chemistry and metallurgy. He returned to the United States, and was instructor in metallurgy at Harvard from 1869 to 1870; professor of chemistry at Lafayette College from 1874 to 1881, and became professor of chemistry in the Massachusetts Institute of Technology in 1885; contributing numerous papers to various chemical journals.

DROWNING, as a capital punishment, was long the custom. Tacitus tells us that the Germans hanged their greater criminals, but that meaner and more infamous offenders were plunged under hurdles into bogs and fens. Drowning was also a Roman punishment. The *Lex Cornelia* decreed that parricides should be sewed up in a sack with a dog, cock, viper and ape, and thrown into the sea. The Anglo-Saxon codes ordered women convicted of theft to be drowned. The pit, ditch or well was for drowning women; but the punishment was sometimes inflicted on men. As late as 1611 a man was drowned at Edinburgh for stealing a lamb. The custom survived in Scotland until 1685, and in France as late as 1793. See also CAPITAL PUNISHMENT in these Supplements.

DROYSEN, JOHANN GUSTAV, a German historian; born in Treptow, Pomerania, July 6, 1808. He was professor of history at Berlin in 1833–40; at Kiel from 1840 to 1848; at Jena from 1848 to 1859; and again at Berlin from 1859 until his death. His historical writings are of great value. Among them are *History of Prussia* (12 vols., 1876); *History of Danish Politics from Acts and*

Documents (1850); and *History of Alexander the Great* (1833). Died in Berlin, June 19, 1884.

DROZ, ANTOINE GUSTAVE, a French novelist; born at Paris, June 9, 1832, grandson of Jean Pierre Droz (1746–1823), the noted sculptor. At first Droz studied art, but soon turned to journalism, where he was a brilliant success, especially in *Monsieur, Madame, et Bébé* (1866), which ran through 120 editions. Others of his works are *Babolein* (1872) and *Une Femme Gênante* (1875).

DRUGGET, a woven and felted coarse woolen fabric, usually with a printed pattern, chiefly used for covering carpets, and hence often called crumbcloth. The name is also given to a stout dress fabric made with a linen warp and a worsted weft. This stuff is still made by hand-loom in Scotland.

DRUIDS, UNITED ANCIENT ORDER OF. See BENEFIT SOCIETIES, in these Supplements.

DRUM ARMATURE. See ELECTRICITY, § 81, in these Supplements.

DRUMFISH, a marine fish of the genus *Pogonias*, found along the Atlantic coast of America. The name refers to its producing a peculiar sound, which is probably caused by rushing of air in the air-bladder.

DRUMLIN, a term in geology for a low hill formed of an unstratified mass of glacial deposit. Such hills are found in Ireland, Scotland, and in the United States in Wisconsin, New York, and the New England states. The drumlins are generally rounded and smooth, but sometimes are rough, with steep sides.

DRUMMOND, HENRY, a Scottish clergyman and scientist; born near Stirling, Scotland, Aug. 17, 1851; graduated from the University of Edinburgh and afterwards studied at Tübingen University, Germany; ordained a minister of the Free Church, and was first stationed in Malta. In 1884 he was appointed professor in science in the Glasgow Free Church College, after a service of seven years as lecturer. He traveled a great deal and wrote an account of his African trip, *Tropical Africa* (1888). But it is as a scientific theologian that he is known to the world. He wrote *Natural Law in the Spiritual World* (1883); *Pax Vobiscum; The Changed Life; The Programme of Christianity* (1891); *The Greatest Thing in the World* (1893); *The Ascent of Man* (1894); *The City Without a Church;* and *Baxter's Second Innings.* Died in Tunbridge Wells, Eng., March 11, 1897. See his *Life*, by George Adam Smith, D.D. (1898).

REV. HENRY DRUMMOND.

DRUMMOND, THOMAS, an American lawyer and jurist; born in Bristol Mills, Maine, Oct. 16, 1809; graduated from Bowdoin in 1830; became Federal judge for the district of Illinois in 1860; judge of the northern district in 1865; and in 1869 judge of the United States circuit court for the circuit which included Wisconsin, Indiana and Illinois. This last position he held until 1884, when he was retired on account of age. He died in Wheaton, Illinois, May 15, 1890.

DRUMMOND ISLAND, an island at the northern end of Lake Huron, 18 miles long and 10 wide, belonging to Chippewa County, Michigan.

DRUMMOND LAKE. See DISMAL SWAMP, Vol. VII, p. 259.

DRUMMOND LIGHT OR LIME-BALL LIGHT, a very intense light, produced by directing an ignited stream of oxy-hydrogen gas upon a ball of lime. It was invented by Thomas Drummond of the British navy, in 1826. It was first used in coast-survey work to signal from one station to another.

DRUPE. See BOTANY, Vol. IV, p. 151.

DRUSUS, CLAUDIUS NERO. See TIBERIUS, Vol. XXIII, pp. 335–337.

DRYBURGH, a beautiful ruined abbey in Berwickshire, five miles E.S.E. of Melrose, on the Tweed. It contains the graves of Sir Walter Scott and of his son-in-law, Lockhart.

DRYDEN, a village of Tompkins County, central New York, 30 miles N. of Owego, on the Lehigh Valley railroad. It contains a graded school, a woolen mill, tannery, and a newspaper-office. It has a magnetic spring, and Dryden Spring Place attracts many health-seekers. Population 1890, 663.

DRYING-MACHINE, a name applied to an apparatus for drying long webs of calico and other fabrics. See BLEACHING, Vol. III, p. 817.

DRYOPHIDÆ. See SNAKES, Vol. XXII, pp 193–195.

DRY-PLATE PHOTOGRAPHY. See PHOTOGRAPHY, in these Supplements.

DRY TORTUGAS, a group of 10 small, low islands belonging to Monroe County, Florida, and situated 40 miles W. of the most western of the Florida Keys. On these islands stand two lighthouses, one 150 feet high, on the southwesternmost island, with a fixed dioptric light of the first order, lat. 24° 38′ 5″ N., long. 82° 52′ 53″ W. The other is inside Fort Jefferson, lat. 24° 37′ 47″ N., long. 82° 52′ 53″ W., and is of less importance and size. Fort Jefferson, on Garden Key, is an important fortification, which, during the Civil War, was used as a penal station for Confederate prisoners, and in which prisoners under sentence of court-martial are still occasionally confined.

DUALIN, an explosive compound invented by Carl Dittmar. Its composition is: nitrate of potassa, 20 per cent; sawdust, 30 per cent; nitroglycerine, 50 per cent. It is more sensitive to heat than dynamite, and can be exploded by the slightest friction even when frozen. It has twice the explosive power of dynamite. See NITROGLYCERINE, Vol. XVII, p. 521.

DUALISM, the name given to a philosophical theory, according to which two principles of different natures, original, and incapable of being derived the one from the other, lie at the bottom of everything; as, for example, the ideal and the real; the spiritual and the material; the

good and the evil, etc. See EVOLUTION, Vol. VIII, pp. 752, 753.

DUAL NUMBER. See GRAMMAR, Vol. XI, p. 40.

DUANE, JAMES CHATHAM, an American military engineer; born in Schenectady, New York, June 30, 1824; graduated from West Point in 1848. From 1848 until 1861 he was successively instructor at West Point, superintendent of fortifications and lighthouses for New York, engineer in charge with the Utah expedition of 1858, and again instructor at West Point. He was actively engaged during the Civil War, both in the army of the Potomac and the army of the South, and was advanced to the rank of lieutenant-colonel. After the war he became chief of engineers, with the rank of brigadier-general, and was retired in 1888. Later he was president of the New York Croton aqueduct commissioners. Died in New York city, Nov. 8, 1897.

DUANE, WILLIAM, an American journalist and politician; born near Lake Champlain, New York, in 1760. The son of Irish parents, when a boy was sent by them to Ireland to receive his training. He displayed throughout his life the spirit of the Irish agitator, to which he added a spitefulness which brought him many enemies and few friends. He was a printer by trade, and in 1784 went to India and began the publication of the Calcutta *World*, but soon made himself obnoxious to the authorities and was sent to England. There he became connected with the London *Times*. He moved to the United States in 1795, and in 1798 became editor of the *Aurora* of Philadelphia, a paper, in its time, of great political influence. He made use of his position to attack the Presidential administrations of Adams and Madison. While at first he had considerable influence, it was soon lost by reason of the coarse and vilifying editorials written by him. He left the *Aurora* in 1822 and went to South America, but returned the next year. He was given a small office as an attaché of the supreme court, and retaining it until his death, which occurred in Philadelphia, Pennsylvania, Nov. 24, 1835.

DUANE, WILLIAM JOHN, an American statesman; born in Clonmel, Ireland, May 9, 1780. He was a son of the preceding, but was a man of more culture and less spleen. He studied law, and as a lawyer achieved a reputation. He was an active supporter of Andrew Jackson, and was selected by him for the position of Secretary of the Treasury. In 1833, foreseeing the probability of a panic that year, he declined to withdraw the United States funds from the United States Bank, lest he precipitate the panic. On account of his refusal, he was removed from office. He afterward devoted himself to the practice of law and published two works of value, *Internal Improvements of Pennsylvania* and *International Law*. He died in Philadelphia, Pennsylvania, Sept. 26, 1855.

DUBBS, JOSEPH HENRY, an American clergyman and writer; born Oct. 5, 1838, in North Whitehall, Pennsylvania. Graduated in 1856 from Franklin and Marshall College and from Mercersburg Theological Seminary in 1859, he entered the ministry of the Dutch Reformed Church. After continuous pastoral work until 1875, he became professor of history and archæology in Franklin and Marshall College. He wrote a number of articles on historical subjects and contributed largely to periodicals. His most popular published works are *Historic Manual of the Reformed Church* (1885) and *Early German Hymnology* (1888).

DUBLIN, UNIVERSITY OF, OR TRINITY COLLEGE. See DUBLIN, Vol. VII, p. 498.

DÜBNER, FREDERICK, a German philologist; born in Hörselgau, Germany, Dec. 20, 1802. From 1826 to 1831 he was an instructor in the Gotha Gymnasium, and after that time, until his death, lived in Paris, engaged in various editorial work. He was editor, for Didot, of the *Thesaurus* and *Bibliotheca Græca*, and, for Napoleon, of a life of *Cæsar* (1867), and numerous classical editions for others. In the *Bibliotheca Græca* he contributed the notes to the portions on Theocritus, Aristophanes. Theophrastus and Plutarch. He died near Paris, Oct. 13, 1867.

DUBNITZA, a town of southwestern Bulgaria, 33 miles S. of Sofia. It has extensive iron-works. Population, 6,000.

DUBOIS, a village of Clearfield County, western central Pennsylvania, located in the coal region, 129 miles N.E. of Pittsburg, on the Buffalo, Rochester and Pittsburg, and Mahoning Valley railroads. It has a machine-shop, planing and lumber mills, and a sash and blind factory. Population 1890, 6,149.

DUBOIS, AUGUSTUS JAY, an American civil engineer; born April 25, 1849, in Newton Falls, Ohio. Graduated from the Yale Sheffield Scientific School in 1869, and after several years spent in graduate study at Yale and in Germany, at Freiburg, he was appointed to the chair of engineering in Lehigh University, Pennsylvania, and in 1876 of mechanical engineering at the Sheffield Scientific School, and in 1884 that of civil-engineering in the same institution. He wrote a number of authoritative treatises, among the later ones of which are *The Strains in Framed Structures* (1883) and *Tables for Bridge-Engineers* (1885). He also made several valuable translations; among them, *Thermodynamics* (1880), by Roentgen.

DUBOIS, CLÉMENT FRANÇOIS THÉODORE, a French organist and composer; born in Rosney, Aug. 24, 1837. He early attracted attention in Paris, by his playing, and in 1861 won the prix de Rome. Since 1877 he has occupied Saint-Saëns's position as organist at the Madeleine, Paris. He is well known as a composer, chiefly on account of his *Les Sept Paroles du Christ* (1867). Others of his works are *Le Pain Bis* (1879); and *Aben-Hamet* (1884); and a number of single pieces.

DUBOIS, JOHN, a Franco-American churchman, bishop of New York; born in Paris, Aug. 24, 1764. Educated at the college of Louis le Grand, among his fellow-students were Desmou-

lins and Robespierre. He afterward studied at the seminary of St. Magloire. In 1787 he was ordained assistant priest of St. Sulpice. At the time of the French revolution he sailed from France, and arrived in Norfolk, Virginia, bringing letters from Lafayette. He was first received by Bishop Carroll of Maryland; stationed at Norfolk and afterward in Richmond. After serving in Frederick, Maryland, where his mission included Emmittsburg, Maryland, and Winchester and Martinsburg, Virginia, in 1806 he erected a church in Frederick; and in 1809 he founded Mount St. Mary's College, which has sent forth thousands of priests. Dr. Dubois was the first superior of the Sisters of Charity in the United States, who were established at Emmittsburg under his protection. In 1826 he was appointed bishop of New York, being the second to hold this see. He was consecrated at Baltimore, Oct. 29, 1826, and installed in the following month at St. Peter's Cathedral, New York, where he served until 1838. He died in New York, Dec. 20, 1842.

DUBOIS, PAUL, a French sculptor; born in Nogent-sur-Seine, July 18, 1829. He studied under Toussaint, in Paris. His first exhibited work was *Saint-Jean, a Child*, in 1860, done at Florence. He was made an officer of the Legion of Honor and a member of the Institute. Among the more famous of his works are *A Florentine Singer of the Fifteenth Century; Charity:* and *Narcissus at the Bath.* A portrait-painter of some reputation, an example of his work is *My Children.*

DU BOIS, WILLIAM EWING, an American writer and authority on numismatics; born in Doylestown, Pennsylvania, Dec. 15, 1810; became assistant assayer of the United States mint at Philadelphia in 1836 and assayer in 1872. He wrote *A Manual of Gold and Silver Coins of All Nations* (1842–51) and *A Description of Ancient and Modern Coins* (1860), besides making the extensive numismatic collection of the mint. He died in Philadelphia, July 14, 1881.

DU BOIS-REYMOND, EMIL, a German physiologist; born in Berlin, Nov. 7, 1818. In 1841 he began the researches in animal electricity with which his name is chiefly identified. In 1858 he succeeded Johannes Müller in the chair of physiology at Berlin, and in 1867 was elected permanent secretary of the Academy of Sciences. He wrote *Investigations into Animal Magnetism* (1848–84); *A Description of the Apparatus and Experiments of Electro-Physiology* (1863); *Leibnitz and Modern Science* (1871); *The Limits of Our Knowledge of Nature* (1872); and *Civilization and the Science of Nature* (1878). Died in Berlin, December 26, 1896.

DUBUFE, EDOUARD, a French painter; born in Paris, March 30, 1820. He studied under his father, Claude Dubufe and Delaroche. He made a specialty of portrait-work, although he has done much on religious subjects. Among his portraits are those of the Princess Mathilde, Empress Eugénie, Rosa Bonheur and Alexandre Dumas, the younger. He was an officer of the Legion of Honor. He died in Versailles, Aug. 11, 1883.

DUBUFE, ÉDOUARD MARIE GUILLAUME, a French painter, son of the preceding; born in Paris, May 16, 1853. He studied under Mazerolle, and was taught by his father. Among his works are *The Death of Adonis* and *A Study* (1877) and *April* and *Saint Cecilia* (1878). The first year he received a medal of the third class, and the second year one of the second class.

DUBUQUE, a city of eastern Iowa and capital of Dubuque County (see Vol. VII, p. 504). It has extensive manufactories of carriages, wagons and plows, and its lumber and pork-packing interests are large. It has also manufactories of wooden-ware, brick, leather, white lead, shot, engines, machinery, farming implements, beer, flour, soap, candles, artificial stone, boots and shoes, etc. In addition to an excellent system of public schools, its educational interests include a German Presbyterian Theological Seminary, St. Joseph College and Academy (Catholic), St. Mary's Academy, the Iowa Institute of Science and Arts, several convents, a business college, and an Episcopalian school. Population 1890, 30,147; 1895, 40,576.

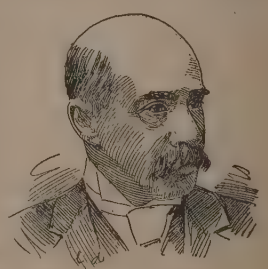
DU CAMP, MAXIME, a French miscellaneous writer; born at Paris, Feb. 8, 1822. He made repeated journeys in the East, and ultimately settled in Paris. He wrote of his Eastern travels, and poems, romances, a history of the Commune, and a great work on Paris and its institutions. He was made an officer of the Legion of Honor in 1853. He was elected a member of the French Academy, Feb. 26, 1880. Among his writings are *Paris: Its Organs, Its Functions, Its Life* (1867), and *History of the Paris Commune*, the work which secured for him his election to the Academy, and by which he is best known. He died in Paris, Feb. 9, 1894.

DUCAT. See NUMISMATICS, Vol XVII, p. 655.

DUCATO CAPE, an abrupt headland, in lat. 38° 33′ N., long. 20° 23′ E., at the southwest extremity of Leukas or Santa Maura, one of the Ionian islands, dreaded by sailors for the fierce currents around it. From its summit criminals were anciently cast into the sea.

DUCCIO DI BUONINSEGNA. See SCHOOLS OF PAINTING, Vol. XXI, p. 433.

DU CHAILLU, PAUL BELLONI, a French traveler and author; born in Paris, July 31, 1835. His father was a trader on the west coast of Africa. At an early age the son went thither, and acquired a knowledge of the languages and character of the native tribes. In 1852 he removed to the United States with a cargo of ebony-wood, and there published a series of papers on the Gaboon country. In 1855 he returned to the "Dark Continent," and spent four years exploring the then unknown region lying within two degrees on each side of the equator. During this time he shot and stuffed many birds and



PAUL B. DU CHAILLU.

animals, among which were several gorillas and a monstrous ape until then unknown to scientists. In 1859 he returned to New York City with his specimens and a collection of African weapons and implements, which were exhibited publicly, and eventually sold to various purchasers. An account of this enterprise was published under the title of *Explorations and Adventures in Equatorial Africa* (1861; rev. ed. 1871). This book's extraordinary statements provoked doubt among scientists as to the author's exact truthfulness. To vindicate himself from severe aspersions, Du Chaillu visited Africa again in 1863, and returned in 1865. On this voyage he discovered the pigmies, a race of beings which has been the occasion of much discussion and speculation. He published an account of this second expedition under the title, *A Journey to Ashango Land* (1867). He then lived in the United States, where he lectured and published a series of books of adventure, among which works are *Stories of the Gorilla Country* (1868); *Lost in the Jungle* (1869); and *The Country of the Dwarfs* (1871). Subsequently he traveled in Sweden, Norway, Lapland and Finland, and published *The Land of the Midnight Sun* (1881); *The Viking Age* (1889); and *Ivar, the Viking* (1893).

"DUCHESS, THE." See HUNGERFORD, MRS., *post*, p. 1633.

DUCHOBORTZI, one of the numerous sects of mystics, which flourish in Russia, traceable to the eighteenth century, who depend upon an inward light, like the Quakers; attach little importance to the sacraments, priesthood, and services of the church; and reject the doctrine of the Trinity and of the divinity of Christ. Alexander I allowed them to settle in Taurida, in south Russia; Nicholas I, in 1841, transferred them to Transcaucasia and Siberia, where they have become quite a powerful sect. Their refusal to bear arms led to their persecution by the government, and in 1899 some thousands of them emigrated to Canada.

DUCKBILL. See PLATYPUS, Vol. XIX, p. 213.

DUCK RIVER, rises in Coffee Co., Tenn., follows a westward course, and enters the Tennessee river 16 miles S.W. of Waverly; length about 200 miles; navigable for about 50 miles for small craft.

DUCKWEEDS, the common name of species of the family *Lemnaceæ*, small, free-swimming water-plants, including the smallest of flowering plants. The plant is a small, floating, leaf-like body, from which roots hang downward. The extremely reduced flowers arise from a pocket-like hollow of the thallus-like body. Duckweeds multiply rapidly by branching, each branch repeating the form of the parent body, and thus speedily cover the surface of stagnant water. The genera are *Lemna*, *Speirodela* and *Wolffia*. The species are regarded as very much reduced arums.

DUCLERC, CHARLES THÉODORE EUGÈNE, a French journalist and statesman; born in Bagneres-de-Bigorre, Nov. 9, 1812; became a journalist in Paris, and in 1848 a member of the constituent assembly and Minister of Finance. He lived in retirement during the empire, and in 1871 was elected to the National Assembly, where he acted with the Republican Left. In 1875 he became vice-president of the Assembly, and on December 10th of that year was elected a life senator. In August, 1882, he became Premier, but his administration only lasted until February, 1883. He died in Paris, July 21, 1888.

DUCROT, AUGUSTE ALEXANDRE, a French soldier; born in Nevers, Feb. 24, 1817, He entered the army in 1840 as a lieutenant, and at the time of the battle of Sedan, was a general in command of a division. At that battle he was taken prisoner and imprisoned. He escaped, however, and reached Paris in time to take an active part in the last battles of the Franco-Prussian war, and to help suppress the Commune. He afterward was elected to the Assembly, and used his influence against the Empire. He published *The Day of Sedan* (1871); *The Defense of Paris* (1878), and works of minor importance. He died in Paris, Aug. 17, 1882.

DUCTILITY. See WIRE, Vol. XXIV, p. 615.

DUDLEY, BENJAMIN WINSLOW, an American surgeon; born April 12, 1785, in Spottsylvania County, Virginia. After his graduation from the University of Pennsylvania's medical department he spent four years in Europe, studying under the best physicians of the day, such as Sir Astley Cooper of London, and Paul A. Dubois of Paris. Upon his return to the United States in 1814, he entered into active practice of his profession at Lexington, Kentucky. He was so successful that, not only in the United States, but also in England, he was judged to be the peer of any physician, and was especially noted as a lithotomist. He was active in the organization of the Transylvania University medical department, and was one of its professors for a number of years. He died Jan. 20, 1870, in Lexington, Kentucky.

DUDLEY, CHARLES EDWARD, an American merchant and public man; born May 23, 1780, in Staffordshire, England. He moved to the United States in 1794, and engaged in trade with the West Indies. He acquired a large amount of property, and became one of the most prominent merchants of Albany. He was elected to the United States Senate to fill the seat vacated by Martin Van Buren and served from 1829 to 1833. He was also mayor of Albany from 1821 to 1828, and a state senator from 1820 to 1825. He died in Albany, New York, Jan. 23, 1841.

DUDLEY, EDMUND, an English lawyer and statesman; born about 1462, and died in 1510; Empson's partner in carrying out the obnoxious policy of Henry VII, whose son and successor sent him to the block in 1510. He was father of the Earl of Northumberland. See LEICESTER, Vol. XIV, p. 425.

DUDLEY, HENRY BATE, a British journalist and clergyman; born in 1745, in Fenny Compton, England. A man of great ability, he distinguished himself in several lines. He was a writer of no mean talent; his *Rival Candidates* (1775) and *Travelers in Switzerland* (1793), both comic

operas, established him among the dramatists of his time. His services as a magistrate were such as to bring him a baronetcy. As a clergyman, he became prebendary of Ely. He established the *Morning Post* in 1775 and the *Morning Herald* in 1780. He was the author of several pamphlets on political economy. He died in London, Feb. 1, 1824.

DUDLEY, Joseph, a colonial governor of Massachusetts; born in Roxbury, Massachusetts, Sept. 23, 1647. In 1675 he helped to negotiate a treaty with the Narragansett Indians. In 1682 he visited England on behalf of the colonists; in 1685 was appointed president of New England, and in 1687 chief justice of the supreme court. From 1690 to 1693 he was chief justice of New York, and governor of Massachusetts from 1702 to 1715. He died in Roxbury, April 2, 1720.

DUDLEY, Paul, an American jurist and naturalist; born in Roxbury, Massachusetts, Sept. 3, 1675. He was the son of the preceding, and received his education at Harvard College, and the Temple in London. When he was but 27 he was appointed attorney-general of the province of Massachusetts. He was appointed chief justice in 1745. He was a man of broad scholarship and took an active interest in natural science, publishing several papers on various topics. He was an anti-Catholic, and a strong supporter of the New England churches and colleges. He died in Roxbury, Jan. 25, 1751.

DUDLEY, Thomas Underwood, an American Protestant Episcopal bishop; born in Richmond, Virginia, Sept. 26, 1837. He was ordained a priest of the Protestant Episcopal Church in 1868. Previous to that time he had been a professor in the University of Virginia, from which institution he had been graduated in 1858. During the Civil War he was in the Confederate army. In 1869 he became rector of Christ's Church, Baltimore, and in 1875 was appointed assistant bishop of the diocese of Kentucky. He was elected bishop in 1884. He is the author of *A Sunday-School Question Book* (1872) and *A Nice Discrimination the Church's Need* (1881).

BISHOP DUDLEY.

DUE PROCESS OF LAW, a legal term which means according to law, in the regular course of its administration by courts of justice. The fifth amendment to the constitution of the United States provides that no person shall be deprived of life, liberty or property, without due process of law, and the fourteenth amendment provides that no state shall deprive a person of life, liberty or property without due process of law. The state constitutions contain similar provisions. The term "due course of law," or "the law of the land," is sometimes used in the same sense.

DUER, John, an American jurist; born in Albany, New York, Oct. 7, 1782. He studied law, and acquired a reputation in New York City as an insurance lawyer. He was delegate to the state constitutional convention in 1821; appointed one of the commissioners to revise the statute law of the state in 1825, and was elected an associate judge of the superior court, becoming chief justice in 1857. He published a number of works, one of which, *A Treatise on the Law and Practice of Marine Insurance*, has become a standard authority in the United States. He died on Staten Island, Aug. 8, 1858.

DUER, William Alexander, an American jurist and educator, brother of the preceding; born in Rhinebeck, New York, Sept. 8, 1780; died in New York, May 30, 1858. After practicing law in Philadelphia, New Orleans, New York and Rhinebeck, he enlisted in the navy for a brief period during the trouble with France in 1708, and contributed to several papers of the day, and then settled down to active practice in Rhinebeck. There he was elected to the legislature. He was the author of school laws upon which the present New York laws are based, and was a promoter of river and canal navigation. He served as judge of the supreme court of New York from 1822 to 1829. In 1829 he was elected president of Columbia College, a position he retained until 1842. He was an active worker in the literary and historical societies of the city. He published *Life of William Alexander, Earl of Stirling* (1847), and numerous articles descriptive of early United States history, which are highly valued to-day.

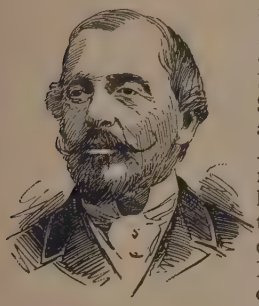
DUEZ, Ernest Ange, a French painter; born in Paris, March 8, 1843; studied in the atelier of Pills, and made his appearance in the Salon of 1868. He was a figure-painter of unusual talent. He was made an officer of the Legion of Honor in 1889. Among his paintings are *Combat Between Roland and Oliver* (1869); *The End of October* (1877); *Saint Cuthbert* (1879), and a number of scenes from Parisian life. He died in Paris, April 5, 1896.

DUFF, Alexander, a Scottish Presbyterian missionary; born in Moulin, April 25, 1806. He went to India in 1829, the first missionary sent out by the Church of Scotland to that country. He was the first missionary to combine educational with religious teaching. He founded a school at Calcutta which grew into large proportions. He joined the Free Church party of the Church of Scotland after the rupture of 1843. He continued in missionary work until 1863, when his health compelled him to remain in Scotland. He was a professor in New College, Edinburgh, at the time of his death. He was perhaps the most influential member of the Free Church. He died in Edinburgh, Feb. 12, 1878.

DUFF, Sir Mountstuart Elphinstone Grant, a British lawyer and statesman; born in 1829, and educated at Edinburgh and Oxford, where he graduated in 1853. He was called to the bar in 1854, and entered the House of Commons in 1857,

as member for the Elgin burghs, continuing to represent that constituency in the Liberal interest till 1881. He was appointed Under-Secretary of State for India in 1868, and held that office till 1874. On the formation of Mr. Gladstone's second administration in May, 1880, he was appointed Under-Secretary of State for the Colonies. This office he resigned in July, 1881, on being appointed governor of Madras. During his successful administration of this great province, he made several tours from end to end of the presidency, in order to see with his own eyes what was requisite to be done. In 1886 he resigned the governorship. He was lord rector of the University of Aberdeen from 1866 to 1872. He is the author of *Studies in European Politics*, and other works.

DUFFERIN AND AVA, Frederick Temple Hamilton Blackwood, Marquis of (created 1888), a British diplomat and statesman, and lineal descendant of Sheridan, was born at Florence, Italy, June 24, 1826. He was the son of the Hon. Price Blackwood, fourth baron of Dufferin and Clandeboye, and Helen Selina Sheridan, Lady Dufferin, authoress of *The Irish Emigrant's Lament*, and of many familiar Irish ballads. The latter was a sister of the Duchess of Somerset, renowned, when Lady Seymour, as the queen of beauty at the famous Eglinton tournament, and of Lady Stirling-Maxwell, better known as the Hon. Mrs. Norton, poet and novelist—all three being the granddaughters of the wit, orator and dramatist, Richard Brinsley Sheridan. Lord Dufferin was educated at Eton, and at Christ Church, Oxford, and succeeded in 1841 to the title while still in his minority. In 1850 he was created an English baron, and for some years was one of the lords-in-waiting to her Majesty, Queen Victoria. In 1846–47 he visited the south of Ireland during the famine, and wrote a work entitled *Irish Emigration, and the Tenure of Land in Ireland*. In 1855 he accompanied Lord John Russell to Vienna as an attaché of the British plenipotentiary, and in the following year made a yacht voyage to Iceland, an accounnt of which he published in his *Letters from High Latitudes*. In 1860 he was appointed, by Lord Palmerston, British commissioner to Syria, for the purpose of prosecuting inquiries into the massacre of the Christians in that country. On his return, he was created a K.C.B. On the death of the Prince Consort, Dec. 15, 1861, his was the duty of moving an address of condolence to her Majesty in the House of Lords. In 1864–66 he served as Under-Secretary of State for India, and for a short time was Under-Secretary of War. From 1868 to 1872 he was Chancellor of the Duchy of Lancaster, was sworn a privy councilor, and in 1871 was made an earl of the United Kingdom. From 1872 to 1878 he was Governor-General of Canada. In 1879 he was appointed British ambassador at St. Petersburg, and in 1881 was translated to the embassy at Constantinople, where he remained until he was appointed Viceroy of India, whither he went in 1884. The previous year he was created a G.C.B., and in 1888, on his appointment as British ambassador at Rome, he was created Marquis of Dufferin and Ava. His Indian viceroyship gained him the honors of a G.C.S.I. and G.C.I.E. In 1891 he became ambassador at Paris, a post from which he retired in 1896, at the same time, as understood, ending his career of diplomatic service. In 1878 he received the honorary degree of D.C.L. from Harvard University, and in 1879 was paid a like honor by Oxford University. A general collection of his *Speeches and Addresses* was published in London in 1882, and his *Speeches in India* appeared in 1890. In 1894 he edited an *edition de luxe* of his mother's Irish ballads and poems, and in 1896 contributed an instructive preface to the biography of his ancestor, Richard Brinsley Sheridan. In 1862 he married Harriet, eldest daughter of Captain Archibald Rowan Hamilton of Killyleagh Castle, County Down.



MARQUIS OF DUFFERIN.

DUFFERIN, Lady Harriet, an English authoress, and wife of the Marquis of Dufferin and Ava, was born in 1843 at Killyleagh Castle, County Down, Ireland, her father being Captain Archibald Rowan Hamilton. She married Lord Dufferin in 1862, and contributed largely to her husband's popularity while he filled the posts of Governor-General of Canada and India, and served the crown on his various embassies at St. Petersburg, Constantinople, Rome and Paris. In Canada, during his administration, in the years 1872–78, Lady Dufferin took a hearty interest in woman's educational work, and by her social graces and inimitable tact she endeared herself to all. In India she devoted herself with rare enthusiasm to philanthropic work among the native women, an account of which she published in 1889 in *A Record of Three Years' Work*, and in *Our Viceregal Life in India*, which appeared in the following year. In 1891 she published *My Canadian Journal*, an interesting narrative of viceregal journeys through various portions of the Canadian Dominion, with some acute chapters on the social life as well as the physical beauties of the country.

DUFFIELD, George, an American clergyman; born in Lancaster County, Pennsylvania, Oct. 7, 1732. He was ordained a minister of the Presbyterian Church in 1761; was pastor of several churches in different parts of Pennsylvania, and finally was placed in charge of the Third Church of Philadelphia, where he was a recognized leader in the "New Lights" faction. He was a chaplain during the Revolution, and was the first stated clerk of the American General Assembly. He died in Philadelphia, Pennsylvania, Feb. 2, 1790.—His grandson, George Duffield, also a Presbyterian clergyman, was born in

Strasburg, Pennsylvania, July 4, 1794. He was ordained a minister in 1815, and, after preaching in Philadelphia, New York, and in Detroit, Michigan, settled in the last-named place. He published *Regeneration* (1832) and *Travels in the Holy Land* (1842).—He died in Detroit, Michigan, June 26, 1868.—GEORGE DUFFIELD, son of the preceding, likewise a Presbyterian minister; born in Carlisle, Pennsylvania, Sept. 12, 1818. He was graduated from Yale in 1837 and entered the ministry in 1840. He is known more on account of his hymn-writing than as a theologian. Among his hymns are *Stand Up, Stand Up for Jesus* (1858), and *Blest Saviour, Thee I Love* (1851). He died in Bloomfield, New Jersey, July 6, 1888.

DUFFIELD, JOHN THOMAS, an American clergyman and educator; born in McConnellsburg, Pennsylvania, Feb. 19, 1823. For a short time instructor at Union Academy, Philadelphia, he was later appointed tutor of Greek in Princeton College, from which he had graduated in 1841. He entered the ministry of the Presbyterian Church in 1849 and was located at Princeton. He was professor of mathematics in Princeton from 1850 to 1871, and of mechanics from 1862 to 1871. He has published *The Philosophy of Mathematics* (1867); *Is the Origin of Man by Evolution Consistent With Biblical Anthropology?* (1878); and other works.

DUFFIELD, SAMUEL AUGUSTUS WILLOUGHBY, an American clergyman and author; born in Brooklyn, New York, Sept. 24, 1843. After his graduation from Yale in 1863, he entered the ministry of the Presbyterian Church. Among his works are *English Hymns, Their Authors and History* (1886), and *Latin Hymn-Writers* (1887). He died in Bloomfield, New Jersey, May 12, 1887.

DUFFY, SIR CHARLES GAVAN, an Irish journalist and statesman; born in County Monaghan in 1816. He was for a time a journalist in Dublin and Belfast. He founded the *Nation* in Dublin, in connection with which he published the *Ballad Poetry of Ireland*, of which over forty editions have been sold. In 1844 he was tried and convicted for sedition at the same time as O'Connell, but the House of Lords quashed the conviction. He next helped to found the Irish Confederation. Again, in 1848, he was tried for treason-felony and acquitted. In 1856 he went to Australia, where he practiced law, at Melbourne. He entered politics there, and in 1857 became minister of public works for Victoria, in 1858 minister of lands, and again in 1862. In 1871 he was made prime minister, and in 1873 was knighted. In 1880 he returned to Europe, and published *Young Ireland: A Fragment of Irish History* (1850); *Four Years of Irish History* (1869); and numerous contributions to periodicals.

DUGHET, GASPARD. See POUSSIN, Vol. XIX, p. 650.

DUHAMEL, JOSEPH THOMAS, a Canadian Roman Catholic archbishop; born in Contrecœur, Canada, Nov. 6, 1841. He was ordained priest in 1863, and became curé of Buckingham. In 1874 he was consecrated bishop of Ottawa, and in 1886 became the first archbishop of Ottawa. He was a count of the Holy Roman Empire, an assistant at the pontifical throne, and a knight and grand cross of the Order of the Holy Sepulcher.

DÜHRING, EUGEN KARL, a German philosopher and political economist; born in Berlin, Jan. 12, 1833. He was appointed referendary in the court of justice, but resigned and devoted himself to the study of philosophy and national economy. From 1864 to 1877 he was a private tutor in the Berlin University. He wrote extensively on economical and philosophical subjects; among them, *Capital and Labor* (1865); *The Cost of Living* (1865); *Critical Basis of Popular Economy; History of National Economy and Socialism* (1879); and *Theory and Logic of the Sciences* (1878).

DÜHRING, LOUIS ADOLPHUS, an American physician; born in Philadelphia, Pennsylvania, Dec. 23, 1845. After his graduation from the medical department of the University of Pennsylvania in 1867, he made a special study of dermatology, and spent two years in Europe on that work. Upon his return he attracted attention by his skill in his specialty, and was elected professor of dermatology in his *alma mater*. He has published *An Atlas of Skin Diseases* (1876) and *Epitome of Skin Diseases* (1885).

DUILLIAN COLUMN. See LATIN, Vol. XIV, p. 329.

DUKERIES, THE, a familiar English name for the wooded district around Worksop, in Nottinghamshire, from the number of ducal residences it contains. The most interesting of these is Welbeck Abbey, the seat of the Duke of Portland, which lies four miles southwest of Worksop. It is approached by a tunnel two miles in length, leading to a curious series of underground apartments, including a large library, a ballroom, a picture-gallery with some valuable paintings, and a spacious riding-school. Worksop Manor, adjoining the town on the southwest, was formerly a seat of the Duchess of Norfolk, until its purchase by the Duke of Newcastle. The magnificent domain of this last-named nobleman, Clumber Park, is situated three miles southeast of Worksop. The house contains a fine collection of historical portraits and the lake is an angler's paradise. Thoresby, formerly the property of the Duke of Kingston, is in this vicinity, and the glades of these ducal parks verge on Sherwood Forest, the legendary greenwood home of famous Robin Hood. The Dukeries is a region much frequented by tourists and artists.

DULCE Y GARAY, DOMINGO, Marquis of Castell-Florit, a Spanish soldier; born in Sotés, Spain, May 7, 1808. As captain-general of Catalonia, he took part in the revolution of 1854. He is known, however, by reason of his conduct as captain-general of Cuba from 1862 to 1866, when he did much to abolish the Cuban slave trade. Upon his return to Spain he took part in the Prim conspiracy against Isabel II. He retired to Amélie-les-Bains to recuperate his failing health, where he died, December, 1869.

DULCIMER, a musical instrument resembling a flat box, with sounding-board and bridges, across which run wires tuned by pegs at the sides. It is played by striking the wires with a small piece of wood in each hand, or more usually with two cork-headed hammers. The dulcimer is one of the most ancient of instruments, appearing in Assyrian sculptures, and may be regarded as the ancestor of the piano. It is used to-day in Hungary by the gipsies, and is known in Transylvania as the "santir." It resembles very much the psaltery, the only great point of difference being in the manner of striking the wires. The psaltery is played by means of plectra of ivory or metal, and sometimes with the fingers.

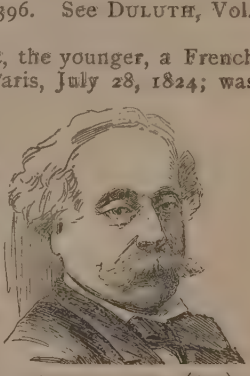
DU LHUT, Daniel Greyslon, a French explorer; born in Lyons. He was the younger son of a French nobleman, and made his way to Canada in quest of adventures and a fortune. Here he became the leader of a band of young Frenchmen who led a roving hunter's life, and under the protection of Frontenac became engaged in the fur trade. To diversify their pursuits they traded or fought, as occasion offered. Du Lhut made several voyages to France in the interest of the colonial minister. Returning, he built a trading-post on the north side of Lake Superior, where Fort William now stands. In September, 1678, he left Quebec, and in the year following visited three Sioux settlements; in June, 1670, he began to explore the upper Mississippi River. At this time he encountered Father Hennepin and his followers, and continued for some time in their company. During his many adventures with the Indians, Du Lhut displayed much sagacity and personal bravery. In 1695 he commanded at Fort Frontenac, and in 1697 was captain of infantry. In his last years he became crippled by gout, and died near Lake Superior in 1709.—His son, Jean Du Lhut, was the founder of the city of Duluth in 1760.

DULONG, Pierre Louis, a French chemist; born in Rouen, Feb. 12, 1785. He was a fellow-student of Berthollet, and later was a co-laborer of Berzelius. He discovered chloride of nitrogen in 1812, and was one of the formulators of the law of the relation of heat to atoms, which is known as "Dulong and Petit's law." In recognition of his services to science he was, in 1823, elected to membership in the Academy of Sciences. He died in Paris, June 19, 1838.

DULSE or DILLESK. See Algæ, Vol. I, p. 508.

DULUTH, a city of northeastern Minnesota, and capital of St. Louis County (see Vol. VII, p. 520). The city received its name from Jean Du Lhut, who built a hut on Minnesota Point in 1760. It dates as a city from 1869. Duluth is a port of entry, most advantageously situated at the western extremity of Lake Superior, at the head of navigation on the great lakes. It is also at the eastern terminus of the Northern Pacific, Duluth and Iron Range, St. Paul and Duluth, Great Northern, Duluth, Missaba and Northern, Chicago, St. Paul, Minneapolis and Omaha, Duluth and Winnipeg, and Lake Superior and Mississippi railroads. The harbor of Duluth has recently been improved greatly by the United States government, which has expended large sums in dredging. The harbor is protected by a narrow strip of land, called Minnesota Point, which forms a natural breakwater, and through which there is a ship-canal. Duluth has large saw-mills, blast-furnaces, grain-elevators with a combined capacity of over 20,000,000 bushels, car-works, and over 275 other manufactories. Numerous regular lines of steamers connect the city with the lake ports. Duluth has 12 public schools, the buildings for which cost $500,000; a high school, which occupies a palatial building costing $300,000; numerous private schools; a business college; the Duluth Yale school; a college preparatory for girls; and a Catholic parochial school. There is also a large public library. Duluth has one of the finest park and boulevard systems in America. The terrace or boulevard drive, which is 9 miles in length, and winds about the hillsides at a height, in some places, of 500 feet above the lake shore, connects Glenwood, Grand View and Cascade parks. This system of driveway and parks is rapidly being extended, and will cover about 50 miles. Extensive deposits of iron, granite and freestone are found in the vicinity. The growth of Duluth during the last 15 years has been remarkable, the population in 1880 being 3,483; 1890, 32,725; 1895, 59,396. See Duluth, Vol. VII, p. 520.

DUMAS, Alexandre, the younger, a French novelist; was born in Paris, July 28, 1824; was educated at the Collége Bourbon. He was the son of Alexandre Davy Dumas, the author of *Monte Cristo* and the *Three Musketeers*, and the grandson of General Dumas, a distinguished officer of the first empire. The younger Dumas was brought up among actors and literary people, and at an early age began to write poetry and sketches. His first important work, *La Dame aux Camélias* (1848), was produced as a drama in 1852. It forms the basis of Verdi's opera, *La Traviata*. M. Dumas's novels deal chiefly with the *demi-monde*. He wrote a number of bright comedies. He became a member of the French Academy in 1875, and a grand officer of the Legion of Honor in 1894. Among his most popular writings are *Le Fils Naturel* (1858); *L'Ami des Femmes* (1864), produced in New York in 1896, under the title, *The Squire of Dames; L'Affaire Clémenceau* (1873); *Dénise* (1885); and *Francillon* (1887). Died in Paris, Nov. 27, 1895.



ALEXANDRE DUMAS (FILS).

DUMAS, Jean Baptiste André, a French chemist; born in Alais, July 14, 1800. He made numerous important discoveries in organic chemistry, isomerism, the law of substitutions, and other departments of chemical philosophy. He

was professor of chemistry at the Athenæum, and afterward at the Sorbonne. From 1849 to 1851 he was Minister of Agriculture and Commerce, and afterward became a life senator. He was a member of the Academy of Sciences, of the Institute, and of the French Academy. His chief work is a *Treatise on Chemistry Applied to the Arts*. He died in Cannes, April 11, 1884.

DU MAURIER, George Louis Parmella Busson, a Franco-English caricaturist, book-illustrator and author; born in Paris, March 6, 1834. In 1851 he studied chemistry at University College, London, but returned to Paris and adopted art as a profession. After doing miscellaneous work in illustration and caricature for *Once a Week* and the *Cornhill Magazine*, he finally joined the staff of *Punch*, the pages of which he has enriched with well-known caricature sketches of society life. He was elected an associate of the Royal Society of Painters in Water-Colors. During 1890 he published a series of essays on his art, and numerous reprints of his sketches in *Punch*. He has illustrated Thackeray's *Henry Esmond*, and *The Story of a Feather*, by Douglas Jerrold, and a number of other works. He was more famous as a writer than an artist. In 1891 he published *Peter Ibbetson*, which attracted attention, but did not attain the popularity of his later work, *Trilby*, which, published in 1894, was the phenomenal success of that or many a year. It is an attractive story of artist life in the Quartier Latin of Paris, with a pathetic and more than beautiful center figure, who gave her name to the tale. A tinge of hypnotism, "out of the mysterious East," added to the crispest of dialogue, completed the positive quantities of the work. It appeared serially in *Harper's*, and, while it was favorably received, the *furore* did not come until the entirety of the story came in book form. Then a "Trilby craze" seized America and traveled across the Atlantic. The story was also dramatized and was a success on the boards. But to attribute to *Trilby* any permanent place in English literature is beyond the dreams of any reviewer. In 1896 a new story, *The Martian*, was published in *Harper's Magazine*, and to its first appearing a melancholy interest attaches, owing to the demise, in London, Oct. 8, 1896, of its versatile author. In his novels, as well as in his art contributions to *Punch*, he struck an entirely new note. With not a little of the art and much of the *bonhomie* of Thackeray, he had none of that novelist's biting cynicism, for his pictorial satires of society and representations of Bohemian life are wrought in the manner of an accomplished and gay-hearted man of the world.

GEORGE DU MAURIER.

DUMB. See Deaf and Dumb, Vol. VII, pp. 3–12.

DUMB-CANE (*Dieffenbachia Saguine*), a plant of the family *Araceæ*, differing remarkably from the plants of that family generally, in its almost arborescent character, but agreeing with them in its acridity, which is in none of them more highly developed. It has a cylindrical stem, with ringed scars and oblong-ovate leaves. It is a native of the West Indies, and has received its English name from the property which it has of producing dumbness when chewed, its acrid poisonous juice causing an immediate swelling of the tongue, accompanied with excruciating pain. It has, however, been used medicinally.

DUMICHEN, Johannes, a German Egyptologist; born in Weissholz, Silesia, Oct. 15, 1833. After a course of study in archæology at Berlin and Breslau, in 1862 he made an expedition into Egypt, studying the monuments of the valley of the Nile, exploring Nubia, the Soudan and parts of the White and Blue Nile. He returned to Prussia in 1865, with valuable copies of hieroglyphic inscriptions. Afterward he was sent on several scientific expeditions, and in 1872 was appointed a professor at the University of Strasburg. Among his works are *Geographic Inscriptions on the Ancient Monuments of Egypt* (1866); *Temples and Tombs of Ancient Egypt, Their Sculptures and Inscriptions* (1872); and a *History of Ancient Egypt* (1877).

DUNA FÖLDVÁR. See Földvar, Vol. IX, 355.

DUNBAR, Paul Laurence, American negro poet, novelist, journalist, and reader; born in Dayton, Ohio, June 27, 1872. He is at present (1899) employed in the library of Congress, Washington. He has written *Oak and Ivy* (1892); *Majors and Minors* (1895); *Lyrics of Lowly Life* (1896); *Lyrics of the Hearthside; Folks from Dixie* (short stories and sketches, 1898); *The Uncalled* (a novel, 1898).

DUNCAN, James Armstrong, clergyman and educator; born in Norfolk, Va., April 14, 1830; graduated at Randolph-Macon College, Virginia, in 1849, and became a Methodist minister. From 1868 until his death, Sept. 23, 1877, he was president of Randolph-Macon College.

DUNCAN, Sara J., the maiden and pen-name of Cotes, Mrs. Everard, q. v., *ante*, p. 924.

DUNCAN, William Wallace, an American clergyman, brother of James A. Duncan; born in Ashland, Va., Dec. 20, 1839; graduated at Randolph-Macon College in 1858; entered the Methodist ministry, and was a chaplain in the Confederate army during the Civil War. He was for a time professor of mental philosophy in Wofford College; and in 1886 was elected a bishop of the Methodist Episcopal Church South.

DUNCKER, Maximilian Wolfgang, historian; born in Berlin, Oct. 3, 1811. After studies at Bonn and Berlin he settled to the study of history at Halle, and became professor there in 1842. His greatest work is his *History of Antiquity*, which embraces the early history of the Egyptians, Babylonians, Lydians, Persians, and Hindus. Died in Anspach, July 22, 1886.

DUNDAS, a group of nearly five hundred islets (also called the Juba Islands), all of coralline formation, lying off the east coast of Africa, in about lat. S. 1°, with only one secure harbor.

DUNDAS, a strait in North Australia, separating Melville Island from Coburg Peninsula, and connecting the Arafura Sea with Van Diemen's Gulf. It is 18 miles wide and 40 long.

DUNDAS, a town of Wentworth County, southern Ontario, at the head of Burlington Bay, west of Lake Ontario, on the Grand Trunk railroad and the Desjardins canal. It has unlimited water-power, and manufactures iron castings, machinery, tools, woolen and cotton goods and wooden articles. Population 1891, 3,546.

DUNDAS, an island in Dixon Entrance, British Columbia, 40 miles N.E. of Queen Charlotte Island, and separated by Chatham Sound from the most southerly of the Alaskan Islands. Lat. 54° 25′ N., long. 30° 35′ E.

DUNDAS, Henry. See Melville, Viscount, Vol. XV, p. 843.

DUNDEE, a village of Monroe County, southeastern Michigan, on the Raisin River, 44 miles S.W. of Detroit, on the Ann Arbor, the Cincinnati, Jackson and Mackinaw, and the Lake Shore and Michigan Southern railroads. It contains flouring-mills, a furniture factory, creameries, a pulp-mill, tannery, and factories where lumber and staves are made. The region about is a fertile agricultural one. Population 1895, 1,232.

DUNDEE, a village of Yates County, western central New York, 3 miles W. of Seneca Lake and 32 miles N. of Elmira, on the Fall Brook railroad. It has foundries, flour-mills, a brewery and a planing-mill. Population, 4,200.

DUNDRUM BAY, an inlet of the Irish Sea, on the east coast of Ireland, in County Down, five miles S. of Downpatrick. It is 13 miles wide at the entrance and only 5 miles long to its inmost recess, forming a long curve into the shore.

DUNE. See Geology, Vol. X, p. 265; Sahara, Vol. XXI, pp. 149, 150.

DUNEDIN, a city of South Island, New Zealand. Of late there has been very little change in the city. In 1891 the population was 22,376. It has street-railways, electric and gas lights, and a very good water system. It has beautiful botanical gardens. Its principal industry is the manufacture and export of woolen goods. See Dunedin, Vol. VII, p. 541.

DUNFISH, codfish cured by a process of coloring known as "dunning." The fish when cured are of a dun color. This is effected by laying them in a pile, after salting, in a dark apartment, covered with grass or some similar substance. They are re-piled at the end of two or three months, and allowed to remain for two or three months longer, when they are fit for use.

DUNGENESS, a headland with a lighthouse, on the southernmost point of Kent, southwestern England, 10½ miles S.E. of Rye.

DUNGLISON, Robley, an American physician; born in Keswick, England, Jan. 4, 1798. He moved to the United States in 1824, and was professor of medicine till 1833 in the University of Virginia. From 1833 to 1836 he was a professor in the University of Maryland, and for more than thirty years afterward occupied a chair in Jefferson Medical College, Philadelphia, Pennsylvania. He translated a number of foreign works and wrote many more on medical topics. Among them are *Dictionary of Medical Science* (1833) and *Practice of Medicine* (1842). At the time of his death, in Philadelphia, April 1, 1869, he was recognized as the leading physician of his time.

DUNKIRK, a thriving city, railroad center and port of entry of Chautauqua County, western New York, on Lake Erie, 35 miles S.W. of Buffalo. It has a good harbor, is the western terminus of the Erie railroad, has extensive locomotive-works, a grain and coal elevator, and several mills and factories. The city has a system of water-works, is lighted by gas, has an orphan asylum, free reading-room and library. Population 1890, 9,416.

DUNLAP, a village of Harrison County, western Iowa, on Boyer River, 51 miles N.E. of Omaha, on the Chicago and North-Western railroad. It has a flour-mill, a newspaper-office, a fine hotel and carries on a thriving trade. Population 1895, 1,230.

DUNLAP, William, an American artist and writer; born in Perth Amboy, New Jersey, Feb. 19, 1766. He studied painting both in New York and London, but first attracted attention by his dramas, *The Father* (1789) and *André* (1798). He engaged in the theatrical business in New York, but made a failure of it. He then turned his attention to painting and produced some successful works. Among his paintings are *Calvary* (1828) and *Christ Rejected* (1821); and among his writings, *History of the American Theater* (1832) and *Arts of Design in the United States* (1834). He died in New York City, Sept. 28, 1839.

DUNLIN. See Sandpiper, Vol. XXI, p. 260.

DUNMORE, an important village of the Lackawanna valley, in Lackawanna County, northeastern Pennsylvania, three miles N.E. of Scranton, on the Erie and Wyoming Valley railroad. The coal business is the chief employment of the town, as rich mines of anthracite are in the vicinity. Population 1890, 8,315.

DUNMORE, John Murray, Earl, a colonial governor of Virginia; born in 1732; made a peer in 1756, and governor of New York in 1770, and of Virginia in 1771. In 1772 he went to Williamsburg, Virginia, where the promulgation of his stern measures caused much dissatisfaction. In 1776, supported by a number of newly acquired loyalists, he raided the settlers on York and James rivers, destroying their property and kidnaping their slaves. On December 9th his band was defeated in a skirmish at Great Bridge, in revenge for which he set fire to Norfolk. In June of the following year his party occupied Gwynn Island, in Chesapeake River, where he was wounded and his band dislodged. His vessels thereafter made depredations on the coast and river banks of Virginia, but with only small results. The minor craft were eventually burnt, and the large ones sent to the West Indies. He returned to England, and in 1786

was appointed governor of the Bermuda Islands. He died in Ramsgate, England, in May, 1809.

DUNNAGE, a name applied to miscellaneous fagots, boughs, bamboos, odd mats or sails, or pieces of wood, laid in the bottom of the hold to keep the cargo of a ship out of the bilge-water, or placed between parts of the cargo to keep them steady.

DUNNETT HEAD. See CAITHNESS, Vol. IV, p. 647.

DUNNOTTAR CASTLE, the ancient seat, now in ruins, of the Keiths, the Earls Marischal of Scotland, on the Kincardineshire coast, 1½ miles S. of Stonehaven. It occupies the top of a rock 4½ acres in extent and 160 feet high; overhanging the sea, with a deep though dry chasm between it and the mainland, and it is approached by a steep, winding path. The area is surrounded by a wall. Dunnottar Castle was dismantled after the rebellion of 1715, on the attainder of the last Earl Marischal.

DUNRAVEN, WYNDHAM THOMAS WYNDHAM-QUIN, EARL OF, a British yachtsman; born at Adare Abbey, County Limerick, Ireland, Feb. 12, 1841. He was graduated from Christ's College, Oxford. He entered the army, but left after two years' service, and engaged in journalism as war correspondent for the London *Daily Telegraph*. He was chosen Under-Secretary for the Colonies by Lord Salisbury in 1881 and again in 1885. After 1887 he took little part in politics, but devoted himself to sport, and became a recognized British authority on hunting. To the American people he is best known on account of his yacht-racing experiences. With his yacht, the *Valkyrie*, he tried thrice to win the American cup, each time without success. The last trial was in 1895, and resulted in a dispute, in which Dunraven accused the Americans of unfair treatment and tactics. The charges were disproved and he was censured by the British and American press.

DUNS, JOHN, a Scottish Free Church clergyman; born in 1820, in Duns, Berwickshire, Scotland. After his graduation from Edinburgh he entered the ministry of the Free Church in 1844, and continued in active pastoral labor until 1864, when he was appointed professor of natural science in New College, Edinburgh. The *North British Review* has been edited by him since 1857. Among his publications are *Christianity and Science* (1860); *Biblical Natural Science* (1868); and *Speculative Natural Science and Theology* (1877).

DUNSTANBOROUGH CASTLE, a picturesque ruin on the basaltic sea-cliffs of the Northumbrian coast, eight miles N.E. of Alnwick. Crystals of quartz found here are called Dunstanborough diamonds and amethysts.

DUNSTER, HENRY, an American colonial educator, first president of Harvard College; born about 1612, in Lancashire, England. A nonconformist, he left his mother-country to escape persecution. Soon after his arrival in America he was selected for the presidency of Harvard College, which previously had no executive officer. In 1654, after 14 years' service, he resigned on account of differences in regard to belief in infant baptism. He was a man of great energy and power, and through his influence Harvard College was placed upon a firm and lasting basis. He died in Scituate, Massachusetts, Feb. 27, 1659.

DÜNTZER, JOHANN HEINRICH JOSEPH, a German philologist; born in Cologne, July 11, 1813. In 1836 he became privat-docent in Bonn, where he had received his education. In 1846 he took charge of the Cologne Catholic gymnasium library. He is the author of a number of philological and historical works. Among his publications are *Goethe's Faust in Its Unity and Perfection* (1836); *The Myth of Doctor Faust* (1848); *Schiller and Goethe* (1859); *The Poetry of Aristotle* (1840); and *Fragments of the Epic Poetry of Greece* (1842).

DUODENUM. See DIGESTIVE ORGANS, Vol. VII, pp. 225, 226.

DUPANLOUP, FÉLIX ANTOINE PHILIBERT, bishop of Orleans; was born in Savoy, France, Jan. 3, 1802. He received priest's orders in 1825, and, after acting as tutor to the young Orleans princes, was appointed, in 1837, superior of the Little Seminary in Paris. Here he had an opportunity of carrying out still further his favorite views as to education, and he remained devoted to teaching even after his appointment as bishop of Orleans, in 1849. During the reign of Louis Philippe he strove earnestly in behalf of freedom of education and to secure tolerance for the Jesuits. In the Vatican Council he is said to have protested against papal infallibility, but, once the dogma was published, he submitted to the will of the church, and signified his acceptance of it. In 1871 he was elected deputy to the new National Assembly, the only bishop who sat in it. From this time to the date of his death, at Lacombe, Isère, Oct. 11, 1878, he struggled manfully against the attacks constantly made upon the church, both in the Assembly and outside of it. He was nominated a Senator in 1876, and from 1854 a member of the Institute. Among his publications are a *History of Jesus Christ* (1869) and *Education* (1850).

DUPONCEAU, PIERRE ÉTIENNE, a Franco-American author; born in France, in L'Île-de-Ré, June 3, 1760. He removed to America in 1777, as secretary to Baron Steuben, and was admitted to the practice of law about 1784. His best work is *The Indian Languages of North America* (1835). He also wrote a legal work, *The Nature and Scope of the Jurisdiction of the Courts of the United States* (1824). He died in Philadelphia, April 1, 1844.

DUPONT, HENRY, an American powder manufacturer; born near Wilmington, Delaware, Aug. 8, 1812. He was graduated from the West Point Military Academy in 1833, and for a year afterward served in the army. He joined his father at the Dupont Powder Works, established in 1800, in Delaware, and from that time until his death continued in the business. During the Civil War he was major-general of the state militia, and, by his prompt and severe measures, prevented the secession of the state. He supplied the larger part of

the powder used by the Union army during the war. Died in Wilmington, Del., Aug. 8, 1889.

DUPONT, Samuel Francis, naval officer, brother of preceding; born in Bergen Point, N. J., Sept. 27, 1803; died in Philadelphia, June 23, 1865. He entered the navy as a midshipman in 1815; served in the Mexican War; and took a prominent part in the first three years of the Civil War, being in command of the South Atlantic squadron until he retired in 1863, with the rank of rear-admiral. He wrote a treatise on the use of floating batteries for coast defenses, which is valued highly.

DUPORTAIL, Louis Lebeque, a French soldier; born in France in 1736; came to America in 1777, joined the engineer corps, became major-general, acted as engineer-in-chief at the siege of Yorktown, and in 1790, having returned to France, became Minister of War. He was forced to resign in 1791, and in 1794 to flee to America, during the Reign of Terror. Died at sea, in 1802, while returning to France.

DUPRÉ, Jules, painter; born in Nantes, France, in 1812. Self-taught, he exhibited, at the Salon of 1831, five landscapes which at once called attention to his ability. He was classed by critics of his time as the grandest portrayer of field-life in France, and was even more popular at the time of his death than at any time previous. Among his works are *The Return of the Flock; The Sluice;* and *The Landscape.* His *Balloon* and *Old Oak* are in the Museum of Art, New York; and another *Old Oak* is in the Walters Gallery, Baltimore. Died at L'Isle-Adam, near Paris, Oct. 6, 1889.

DUPREZ, Gilbert Louis, the most famous tenor singer of his time; born in Paris, Dec. 6, 1806, the 12th of the 22 children of a Paris perfumer. At the age of ten he entered the Paris Conservatoire and studied under Choron; in 1820 he sang in the chorus of *Athalie*, at the Théâtre Français; made his début at Milan about 1824; in 1825–28 sang at the Odéon, Paris, with no great success; and in 1828–36 in Italy, creating the role of Edgardo, in *Lucia*, at Naples, in 1835, the part having been composed expressly for him. From 1837 to 1849 he sang with great success at the Grand Opéra, Paris, creating a large number of tenor parts, including those in *La Favorita*, *Othello*, and *I Lombardi*. In 1842–50 he was professor of singing at the Conservatoire; and in 1853 founded an École Spéciale de Chant, which turned out many fine singers. In 1865 he was decorated with the Legion of Honor. He composed eight operas, an oratorio (*The Last Judgment*), two masses, and some romances and chamber music; and wrote *L'Art du Chant* (1845); *La Mélodie* (1873); *Souvenirs d'un Chanteur* (1880); and *Sur la Voix* (1882). Died at Passey, Sept. 23, 1896.

DUPUY, Charles Alexandre, a French statesman; born at Puy, Nov. 5, 1851. He began his career by teaching philosophy in various colleges in the provinces, and became school inspector. In 1885, just after he had been appointed head master of Corsica College, he was elected to the Chamber of Deputies as an advanced Republican. In Dec., 1892, he took office for the first time in M. Ribot's ministry, on whose fall, in March, 1893, he became premier. On the murder of President Carnot in 1894, M. Dupuy was retained in office by President Casimir-Perier, and remained in the cabinet until 1895. In Oct., 1898, he again became premier, but resigned in June, 1899.

DUQUESNE, Fort. See Pittsburgh, Vol. XIX, p. 150.

DUQUOIN, a city of Perry Co., Ill., 71 miles S.E. of St. Louis, on the Illinois Central and St. Louis, Alton, and Terre Haute railroads; has extensive coal mines, salt-works, machine-shops, a public library, and a park. Pop. 1890, 4,052.

DURA DEN, a small glen between Cupar and St. Andrews, in Fife, Scotland, through which runs a tributary of the Eden; famous on account of the numerous beautifully preserved fossil fish entombed in its yellow sandstone.

DURA MATER. See Anatomy, Vol, I, p. 864.

DURAMEN. See Botany, Vol. IV, p. 101.

DURAN, Carolus Auguste Émile, a French painter; was born in Lille, July 4, 1837. In 1853 he began to study in Paris; in 1861 he went to Rome and afterward to Spain, where his style was influenced powerfully by Velasquez. For *L'Assassiné* (1866) he gained his first medal; and in 1878 he exhibited his design, *Gloria Mariæ Medicis*, for a ceiling in the Luxembourg. He is most widely known, however, by portraiture, which is distinguished by great vigor, force of coloring, and power of direct realism. Among his paintings are *The Evening Prayer* (1863), a portrait of Émile Girardin, an equestrian portrait of Mlle. Croizette, and portraits of his own children.

DURANCE, an unnavigable river; rises in Hautes-Alpes department, France, and joins the Rhone, 3 miles below Avignon; length, 225 miles. An aqueduct from it, 51 miles long, supplies Marseilles with water, and irrigates 25,000 acres of land.

DURAND, a city, the capital of Pepin Co., Wis., on the Chippewa river (here navigable), and on the Chicago, Milwaukee, and St. Paul railroad, 20 miles W.S.W. of Eau Claire; has a lumber-mill, six creameries, factories of woodenware; and trades largely in wheat and pork. Pop. 1895, 1,372.

DURAND, Alice Marie Céleste (Fleury), a Frenchwoman of letters; born in Paris, Oct. 12, 1842; received her education from her father, and went with him to St. Petersburg, Russia, where he was professor of modern languages in the university. She contributed to Russian journals under the pseudonym "Henry Gréville." In 1872 she married Émile Durand, professor of French in the college at St. Petersburg, and returned to France, where she wrote novels on Russian life, etc., and contributed to French periodicals. Among her works, published under the name "Henry Gréville," are *Dosia* (1876); *Madame de Dreux* (1881); *Aurette* (1891); and *Péril* (1891).

DURAND, Asher Brown, painter; born in Jefferson, N. J., Aug. 21, 1796; apprenticed to an engraver in 1812; attracted local attention by his engraving of Samuel Waldo's painting, *A Beggar*, but became known throughout the United States by his reproduction of Trumbull's *Declaration of*

Independence. He turned his attention to painting in 1835, and produced a number of figure and landscape studies that entitle him to a high place among American artists. Among his paintings are *Harvey Birch and Washington; The Wrath of Peter Stuyvesant; The Capture of André; The Trysting-Tree; Close of Day;* and *Franconia Notch.* He was one of the organizers of the National Academy of Design, and from 1845 to 1861 was its president. He died in South Orange, New Jersey, Sept. 17, 1887.

DURAND-CLAYE, Alfred Augustin, a French civil engineer; born in Paris, July 18, 1841. He was graduated from the Polytechnic School in 1862, and became connected with the École des Ponts et Chaussées, and at the time of his death was a professor in the latter institution. He made a special study of sewage and sewerage systems, and by his directions the large works for the purification of the Seine were built. He died in Paris, April 28, 1888.

DURANGO, a town and the capital of La Plata County, southwestern Colorado, on the Rio de las Animas, and the Denver and Rio Grande railroad. It is in a region of extensive coal deposits, and of stock-raising and agricultural industries. It has abundant water-power, iron and steel works, and is a supply-point for miners. Population 1895, nearly 5,000.

DURANT, Henri, a French physician; famous as the originator of the Red Cross Society. The horror and despair with which he contemplated the terrible scenes that attended or immediately succeeded the battle of Solferino, June 24, 1859, led him to write the book *Un Souvenir de Solferino*, published in 1862, in which was popularized the idea of such a society as now exists under the name of the Red Cross Society for the care of the wounded and sick in battle. He was long baffled in his endeavors in this direction, but he was at length rewarded by the conclusion, in August, 1863, of the Geneva convention, and the institution of the Red Cross Society. Delegates were present from Austria, Baden, Bavaria, Belgium, France, Great Britain, Hanover, Hesse-Darmstadt, Italy, Prussia, Russia, Spain, Saxony, Sweden, Switzerland and Wurtemberg. The work of the society was first brought into operation during the Franco-Prussian war.

DURANT, Henry Towle, an American philanthropist; born in Hanover, New Hampshire, Feb. 20, 1822. His name was originally Henry Welles Smith. He was graduated at Harvard in 1841, read law with General Benjamin F. Butler, and in 1846 was admitted to the bar in Boston, becoming prominent in his profession. He became interested in the New York Belting and Packing Company, and other profitable ventures, and in 1863, on the death of his son, retired from business. He determined to devote his life to the cause of the Christian religion, and, to that end, became a lay preacher in 1864. He became impressed with the necessity of a college for the higher education of women, and founded Wellesley College, at Wellesley, Massachusetts, at a cost of a million dollars and an annual endowment of fifty thousand dollars. It was opened in September, 1875, and maintains a high educational standard. He died in Wellesley, Oct. 3, 1881.

DURAZZO, a maritime town of Albania, European Turkey, built on the rocky peninsula of Peli, in the Adriatic, lat. 41° 19′ N., long. 19° 27′ E. It is fortified, and is a place of considerable antiquity. Its situation in a fertile district gives it an export trade in grain, oil, etc.; but in recent years, owing to partial failures in crops and disease in olives, the exports have been small. Population, 7,000.

DURBAN, the seaport of the colony of Natal, situated on a railroad, and on the northern shore of a nearly land-locked tidal bay. The 30th degree of south latitude passes about six miles to the south of the town, and the 31st degree of east longitude about two miles to the west. The population at the census taken in 1888 was 18,433, composed of 9,044 Europeans, 5,057 natives, and 4,332 Indians. The climate, though hot in one or two summer months, is healthy and suitable for Europeans, the death rate for 1887 being 17 per 1,000. The town was laid out by the Dutch, who formed a republic in Natal before the British, under Sir Benjamin D'Urban, took the colony in 1842.

DURBIN, John Price, an American Methodist Episcopal minister; born in Kentucky in 1800. He became a traveling preacher in 1819; graduated from Cincinnati College in 1825; chaplain of the United States Senate in 1831; became editor of the *Christian Advocate* in 1833; for many years president of Dickinson College; and became secretary of the Missionary Society in 1850. He continued in this office until 1872. During his term, missions were established in India and Bulgaria. He published *Observations in Europe* (1844), and *Observations in Egypt, Syria and Asia Minor* (1845). He died in New York City, Oct. 17, 1876.

DURESS, personal restraint or force, or the fear of injury to the person, or of imprisonment. When any contract has been entered into, or any transaction made, or act done, under duress, the consequences thereof may be avoided by the party thus compelled, or unduly influenced, to act. The acts which will constitute duress, and give the injured party the right to redress, have been considerably extended in recent times, and it is now generally the law that the restraint of property, or a threat of destroying or carrying away property, when accompanied with apparent power to carry the threat into execution, will constitute such duress as to avoid a contract entered into for the purpose of protecting the property threatened. Duress of person or property is generally sufficient ground for the recovery of a payment of money to avoid the threat, where the payment might otherwise be considered a voluntary payment. Thus the payment of money levied as a license under a void city ordinance may be recovered from the city, if the payment was made under threat of arrest or imprisonment. Excessive charges paid to a railroad company refusing to carry or deliver goods, under

such circumstances that the goods would otherwise perish or be greatly injured, have been recovered upon the ground of duress.

DURET, Francisque Joseph, a French sculptor; born in Paris, Oct. 19, 1804. He first attracted public attention by his statue of *Mercury*, finished in 1831. He afterward did a large amount of statue-work. Among his best executions are statues of Molière, Richelieu, and Chateaubriand the *Fisher-Boy Dancing* (1833); *Neapolitan Dancer* (1838); and *Vintager* (1839). He was awarded many prizes, and was made a member of the Institute. He died in Paris, May 25, 1865.

DURFEE, Job, an American jurist; born in Tiverton, Rhode Island, Sept. 20, 1790. He was a member of the Rhode Island legislature from 1814 to 1819 and from 1827 to 1839; a member of Congress from 1821 to 1825; and in 1835 became chief justice of the supreme court of Rhode Island, which office he held until his death, July 26, 1847. He published *Roger Williams in Exile* (1832), and several volumes of poetry.

DURHAM, a city and the capital of Durham County, 25 miles N.W. of Raleigh, on the Norfolk and Western, the Southern and the Seabord Air Line railroads. It contains a college for women and extensive manufactories of tobacco, including smoking-tobacco of several varieties, snuff and cigarettes. Bags and boxes are manufactured here specially for the great tobacco trade. Population 1890, 5,485.

DURHAM BREED OF CATTLE. See Agriculture, Vol. I, p. 387.

DURIVAGE, Francis Alexander, an American author; born in Boston, Massachusetts, in 1814. He was author of numerous popular tales, poems and plays. He wrote under the pseudonym "Old Un." In connection with W. S. Chase he translated Lamartine's *History of the Revolution of 1848*, and was for a time co-editor of *Ballou's Pictorial*. He also published *A Cyclopædia of History* (1836) and *Life-Scenes from the World Around Us* (1853). He died in 1881.

DURKEE, Charles, an American statesman; born in Royalton, Vermont, Dec. 5, 1807. He was educated in his native town, and in the Burlington Academy, subsequently emigrating to the territory of Wisconsin. Here he was elected a member of the first territorial legislature; was again a member of the legislature in 1847, and in 1848 was elected to the first state legislature. A member of Congress in 1849–53, he was, in 1855, chosen United States Senator from Wisconsin; was a member of the Peace Congress in 1861, and was appointed governor of Utah in 1865. He died in Omaha, Nebraska, Jan. 14, 1870.

DUROC, Gérard Christopher Michel, Duke of Friuli, favorite officer and aide-de-camp of Napoleon; born in Pont-à-Mousson, France, Oct. 25, 1772. He began his military life as aid to General Lespinasse in 1792. In 1796 he became aid to Napoleon, and during the remainder of his life was the firm friend and faithful follower of the great general. He was intrusted by Napoleon with many important diplomatic missions, and was with Napoleon in the campaigns of 1805–06 and 1807. He was made marshal of the Tuileries and Duke of Friuli. He was killed in the battle of Wurschen, near Markersdorf, Saxony, May 23, 1813.

DÜRRENSTEIN, a village of Lower Austria, on the left bank of the Danube, 45 miles W.N.W. of Vienna, 3½ miles above Krems. In a ruined castle which stands here, Richard Cœur de Lion was confined for three months by Leopold of Austria. Population, 650.

DURSLEY, a town of Gloucestershire, southwestern central England, near the Cotswold Hills, 15 miles S.W. of Gloucester by rail. Near it are quarries of Bath stone. Population of parish, 2,344.

DURUY, Victor, a French historian and educator; born in Paris, Sept. 11, 1811. Destined for a designer in the Gobelins tapestry-works, he showed singular aptitude for learned studies. In 1833 he became professor of history in the Collége Henri IV, and in 1862 in the École Polytechnique. From 1863 to 1869 he was Minister of Public Instruction. He published numerous and important works, principally on Greek and Roman history. Among his publications are *The History of the Romans* (1844); *History of France* (1852); *History of Ancient Greece* (1862); and *History of Greece* (1889). In 1867 he became a grand officer of the Legion of Honor, and in 1884 a member of the Academy. He died Nov. 25, 1894.

DURYEA, Joseph Tuthill, an American Congregational clergyman; born Dec. 9, 1832, in Jamaica, Long Island, New York. After graduating from Princeton College in 1856, he instructed there in Greek until 1859, at which time he finished the theological studies at Princeton Seminary. He entered the ministry of the Presbyterian Church, and until 1859 was stationed at Troy, N.Y. He went over to the Reformed Dutch Church in 1862; returned to the Presbyterian in 1867; joined the Congregationals in 1879, and after ten years' service in Boston, Mass., was, in 1888–95, pastor of the First Congregational Church of Omaha, Neb. In 1895 he became a pastor in Brooklyn, N. Y. Died there, May 17, 1898.

DUSE, Eleonora, an Italian actress; born about 1860, in Venice. The child of poor parents, she began to earn her living as a strolling player. Going on the stage in 1874, she achieved no great degree of success until 1893, when she scored a hit in New York and Boston. This recognition of her abilities at once assured her success, and her subsequent display of talent established her popularity and gave her a place among the foremost of actresses.

ELEONORA DUSE.

DUSSIEUX, Louis Étienne, a French historian and geographer; born in Lyons, April 5, 1815. In 1850 he became professor of history at the Saint-

Cyr College, after a previous service of eight years as instructor. Among his writings are *Geographical History of France* (1843); *General Atlas of Political and Physical Geography* (1846); *The Strength and Weakness of Russia from a Military Standpoint* (1854); *Cardinal Richelieu* (1885); and *The Army of France* (1884).

DUST, Atmospheric. See Chemistry, in these Supplements.

DUSTIN, Hannah, an American pioneer; born about 1660; was the wife of Thomas Dustin of Haverhill, Massachusetts. In the spring of 1697, Mrs. Dustin, with her infant and nurse, were captured and carried off by the Indians. She was taken by her captors to an island at the junction of the Merrimac and Contoocook rivers, near the present sight of Concord, New Hampshire, enduring the greatest of hardships on the long march. Assisted by a lad from Worcester, who had been in captivity for some time, she secured a tomahawk, herself killed and scalped nine of the sleeping savages, and escaped with her companion. To the governor in Boston she presented the trophies of her victory—a gun, tomahawk, and the scalps of the savages. In recognition of her heroism the general court gave to Mrs. Dustin and her companion $250 each. The island mentioned above is now called Dustin's Island, and there, in 1874, the commonwealths of Massachusetts and New Hampshire erected a granite monument inscribed with the names of Hannah Dustin, Mary Neff, the nurse, and Samuel Leonardson, the English boy.

DUTCH EAST INDIES, a name applied collectively to the Dutch possessions in the East Indies, including Java and Madura, Sumatra, Borneo, Riau-Lingga Archipelago, Banca, Billiton, Celebes, Molucca Archipelago, and the small Sunda Islands. They are situated between lat. 6° N. and 11° S. and between long. 95° and 141° E. In 1602 the Dutch created their East India Company. This company slowly conquered the Dutch East Indies and ruled them during nearly two centuries. This company had a monopoly of all trade east of the Straits of Magellan. They governed as though an independent state. They founded Batavia, in Java, and established a large trade. After the dissolution of the company in 1798, the Dutch possessions were governed by the mother-country. Politically, the territory, which is under the sovereignty of the Netherlands, is divided into (1) lands under direct government, (2) vassal lands, and (3) confederate lands. With regard to administration, it is divided into residencies, divisions, regencies, districts, and dessas (villages). (For earlier information concerning the countries of Dutch East India, see those countries, severally, in these volumes.) The superior administration and executive authority of Dutch India rests in the hands of a governor-general. He is assisted by a council of five members, partly of a legislative, partly of an advisory character. The following table gives the area and population of Java, including Madura, and the outposts, either official or carefully estimated:

Territorial Divisions.	Area. English sq. miles.	Population at the end of 1897.
Java and Madura	50,554	25,697,701
Island of Sumatra: Sumatra, West Coast	31,649	1,353,315
Island of Sumatra: Sumatra, East Coast	35,312	335,432
Island of Sumatra: Benkulen	9,399	158,767
Island of Sumatra: Lampongs	11,284	137,501
Island of Sumatra: Palembang	53,497	692,317
Island of Sumatra: Atjeh	20,471	531,705
Riau-Lingga Archipelago	16,301	107,861
Banca	4,446	93,600
Billiton	1,863	41,558
Borneo, West Coast	55,825	370,775
Borneo, South and East Districts	156,912	809,803
Island of Celebes: Celebes	49,390	1,448,722
Island of Celebes: Menado	22,080	549,138
Molucca Islands	43,864	399,208
Timor Archipelago	17,698	119,239
Bali and Lombok	4,065	1,044,757
New Guinea to 141° E. long	151,789	200,000
Total	736,399	34,091,399

Of the total population in 1896, only 67,156 were Europeans. Of the remainder, about 460,000 were Chinese. There is entire freedom in religious worship. In 1896 there were 103 missionaries of various societies at work, and there were 309,258 Christians.

The total revenue, according to the budget estimates for 1898, was about $55,760,000, and the expenditure about $61,800,000, showing a deficit of about $6,040,000. About one-third of the annual expenditure is for the army and navy, and another third for the general administration, both in Java and in the Netherlands.

In 1896 about 8,950,399 acres were under cultivation, the greater part of which was the property of the government and European owners. The principal products are tobacco, coffee, rice, sugar, cotton, and indigo. The amount raised has increased from year to year. The government ceased to cultivate sugar in 1891, and turned the plantations over to private parties. In 1896–97 the product of the tin-mines of Banca and Billiton was 15,600 tons. There were 328 mines in the two islands.

The imports in 1896 amounted to about $67,330,000, and the exports about $79,850,000. At the end of 1896 there were about 1,112 miles of railways, 300 post offices, 6,669 miles of telegraph lines, with 109 offices, and 28 telephone-offices. The legal coins are those of Holland, as are the weights and measures. There were, in 1896, 162 public elementary schools for Europeans, with 14,280 pupils, and 501 public schools for natives, with 78,759 pupils, and 657 private schools for natives, with 44,838 pupils. See also Indian Archipelago, Vol. XII, p. 818.

DUTCHFLAT, a mountain village of Placer County, northeastern California, 67 miles N.E. of Sacramento. There are productive hydraulic gold-mines here. Pop. 1890, 682.

DUTCH LANGUAGE AND LITERATURE. See Holland, Vol. XII, pp. 84–98.

DUTCH WEST INDIES. The Dutch possessions in the West Indies are Surinan, or Dutch Guiana (see Vol. XI, pp. 251–53), and the colony

of Curaçao (see Vol. VI, p. 709). These colonies were founded through the agency of the Dutch West India Company, which was organized in 1621, and for over fifty years planted and maintained its colonies in North and South America and the West Indies. This company began to lose power about 1674, and ceased to exist in 1794. The area of Surinam is 46,060 square miles, and the population at the end of 1896 was 66,959, besides about 12,000 Indians and negroes living in the forest. The capital is Paramaribo, with a population of 30,500. There were, in 1896, 54 schools, with 7,130 pupils. The productions for 1893 were: sugar, about 12,413,000 pounds; cacao, about 6,397,000 pounds; bananas, 591,128 bundles; coffee, about 72,110 pounds; rice, about 51,712 pounds; rum, about 70,000 gallons; and molasses, about 400,000 gallons. Gold was discovered in 1876, and the value of the product to the end of 1896 was about $8,450,000. The imports in 1897 amounted to about $2,300,000, and the exports, about $2,140,000.

Dutch Curaçao consists of the islands of Curaçao, Bonaire, Aruba, St. Martin (as far as it belongs to Holland), St. Eustache, and Saba. It has an area of 403 square miles, and a population of 49,599 in 1896. At the end of 1896 there were 28 schools, with 5,538 pupils. The imports for 1896 were about $1,200,000, and the exports (excluding Curaçao island), about $148,000.

DUTIES, in the broadest sense of the term, means taxes, but in the limited sense in which it is generally used, the term refers to a tax levied upon imported or exported goods, and in this sense has much the same meaning as imports or customs. See CUSTOMS DUTIES, Vol. VI, p. 729.

DUTTON, CLARENCE EDWARD, an American soldier; born in Wallingford, Connecticut, May 15, 1841. After his graduation at Yale in 1860, and two years of post-graduate study, he entered the Union army and took part with the army of the Potomac as a captain. After the war he entered the ordnance department. He became interested in the study of geology, and was detailed for work in connection with the geological survey of the Rocky Mountains in 1876–86. He has published *High Plateaus of Utah* (1889); *Physical Geology of the Grand Cañon* (1882); and *Hawaiian Volcanoes* (1884).

DUUMVIR, in ancient Rome, one of two officers united in the performance of the duties of an office, and appointed usually for some special magistracy or command. The duumvir usually was chosen for ability, and was treated with great respect. Municipal towns had judges, who were their chief magistrates, and were known as duumviri. Superintendents of the erection of buildings and equipment of navies were duumviri.

DUVAL, CLAUDE, an English highwayman who lived from 1643 to 1670. He was born in Domfront, Normandy, and went to England at the Restoration. He soon engaged in highway robbery, and, after robbing and killing many persons, was captured and hanged at Tyburn.

DUVERGIER DE HAURANNE, PROSPER, a French statesman and writer; born in Rouen, Aug. 3, 1798. He was, at the beginning of his career, a correspondent of the London *Globe*, in company with Guizot. He entered French politics and took part with Casimir-Perier, against Moléa, with Thiers, and against Guizot. He was banished in 1851 on account of his royalist tendencies, and upon his return within a few years, engaged in political writing. He was elected to the Senate in 1876, and was a member of the Academy. Among his writings are *The Principles of Representative Government* (1838) and *History of Parliamentary Government in France* (1873). He died in Paris, May 22, 1881.

DUVEYRIER, HENRI, a French explorer; born in Paris, Feb. 28, 1840. In 1860 he went to Africa, visited Algiers, and thence south into the Soudan. He spent seven years in African exploration, and upon his return was rewarded with great honors. He was made an officer of the Legion of Honor and was elected president of the Geographical Society of France. He made several trips of lesser import, and published a number of valuable treatises. Among his works are *Exploration of the Sahara* (1864); *Livingstone and His Explorations in the Lake Regions of Africa* (1873); and *Tunis* (1881). He killed himself near Sèvres, April 25, 1892.

DUYCKINCK, EVERT AUGUSTUS, an American author; born in New York City, Nov. 23, 1816. He graduated at Columbia in 1835, studied law and was admitted to the bar, but subsequently devoted himself to literature. In conjunction with Cornelius Mathews he edited the *Arcturus* in 1840–42, and in 1847 he became editor of the *Literary World*, which was carried on by himself and brother George to the close of 1853. In 1854 the brothers engaged in the preparation of *The Cyclopedia of American Literature*. Mr. Duyckinck published a *History of the War for the Union* (3 vols., 1861–65;) *National Gallery of Eminent Americans* (2 vols., 1866); *History of the World* (4 vols., 1870); and *Biographies of Eminent Men and Women of Europe and America* (1873–74). He died in New York, Aug. 13, 1878.—DUYCKINCK, GEORGE LONG, an American writer, brother of EVERT, as above; born in New York City, Oct. 17, 1823. He graduated from the University of New York in 1843, studied law and was admitted to the bar. He was associated with his brother Evert in the editorship of the *Literary World*, and in the preparation of the *Cyclopedia of American Literature*, subsequently devoting himself to the biographical literature of the Protestant Episcopal Church. He was author of *Life of George Herbert* (1858), followed by lives of *Bishop Thomas Ken* (1859); *Jeremy Taylor* (1860); and *Hugh Latimer* (1861). He died in New York, March 30, 1863.

DUYSE, PRUDENS VAN, a Belgian poet; born in Dendermonde, in Belgium, Sept. 28, 1804. After completing his academical career, he was appointed archivist of his native town, from which he was removed to the same office in Ghent. He soon afterward received the office of professor of national history in the Athenæum.

He was one of the chief contributors to the revival of Flemish literature, and wrote two volumes of poetry, *Vaderlandsche Poezy* (1840) and *Het Klaverblad* (1848). Died in Ghent, Nov. 13, 1859.

DVOŘÁK, Antonín, a Bohemian musical composer; born Sept. 8, 1841, at Mühlhausen-on-the-Moldau (Nelahozeves), in Bohemia; the son of a butcher and innkeeper. He learned music first from the gipsies, and in 1853–55 from A. Liehmann, an organist at Zlonitz; but at 16 entered the Prague Organ School. Applying for help to the Minister of Public Instruction, his case was referred to Brahms, who befriended him. Between 1873 and 1878 he produced several operas at Prague, but it was his *Stabat Mater* (op. 58), produced under the composer's own direction in London in 1883, which stamped him as a really great composer. His *Spectre's Bride* (op. 69), composed for the Birmingham Festival of 1885, met with a very enthusiastic reception; as also did his oratorio, *St. Ludmila* (op. 71), at Leeds in 1886. The honorary degree of doctor of music was conferred upon him by Cambridge University in 1891; and at the Birmingham Festival in the same year his *Requiem* was produced. A highly dramatic four-act opera, *Dimitrij* (op. 64), was produced at Prague in 1882, and proved a great success. In Aug., 1892, he went to the United States as director of the National Conservatory of Music, New York; and on Oct. 12 a new cantata by him, entitled *Columbus*, was produced at the Metropolitan Opera House, New York. One of his latest works is *The American Flag*, a cantata (op. 102).

ANTONIN DVOŘÁK.

DWARFED-TREE CULTURE, the process of causing trees to grow stunted or dwarfed. Dwarfed trees are characteristic ornaments in Chinese and Japanese houses and gardens. Their production depends upon the prevention of an abundant flow of sap. The trees are planted in small flower-pots, and are very sparingly supplied with water; their strongest shoots are pinched off, and their branches bent and twisted in various ways. These trees often abound in flowers and fruit. See Horticulture, Vol. XII, p. 241.

DWIGHT, a village of Livingston Co., Ill., 72 miles S.W. of Chicago, on the Chicago and Alton railroad; has several banks, churches, warehouses, two newspaper offices, and the Keeley Institute for the treatment of inebriates. On this sanatorium and its adjuncts Dr. Keeley expended about $1,000,000. Pop. 1890, 1,354. See Keeley, Leslie E., in these Supplements.

DWIGHT, a post village of Richland Co., N. Dakota, on the Great Northern railroad, 6 miles by rail W. N.W. of Wahpeton; has 2 churches and an academy. Population 1890, about 275.

DWIGHT, Benjamin Woolsey, an American physician, son of Timothy Dwight of Yale; born in Northampton, Massachusetts, Feb. 10, 1780. He was in early life a physician, and wrote a valuable treatise on *Chronic Debility of the Stomach*. He became a farmer near Clinton, and was for many years treasurer of Hamilton College. He died in Clinton, New York, May 18, 1850.

DWIGHT, Edmund, an American philanthropist; born in Springfield, Massachusetts, Nov. 28, 1780. He became a noted merchant, amassed a large fortune, and was the founder of Holyoke, Chicopee and Chicopee Falls. He took an active interest in educational enterprises, and gave large sums of money toward the establishment of the normal school system of Massachusetts. He died in Boston, April 1, 1849.—His son, Edmund, born in Boston, Sept. 3, 1824, became noted for his interest in the raising and distributing of a fund for the relief of sufferers by the Franco-Prussian war.

DWIGHT, Harrison Gray Otis, an American missionary and explorer, and one of the founders of the Armenian mission; born in Conway, Massachusetts, Nov. 22, 1803. He was graduated from Hamilton College in 1825, and Andover Theological Seminary in 1828. He went to Malta in 1830, and began a series of explorations in Asia Minor and Persia. In 1831 he founded the Armenian mission in Constantinople. He wrote *Travels in Armenia* (1833) and *Catalogue of Armenian Literature* (1850). He died in Vermont, Jan. 25, 1862.

DWIGHT, John Sullivan, an American musical writer; born in Boston, Massachusetts, May 13, 1813. After his graduation from Harvard in 1832, he was for some time pastor of a Unitarian Church. He was one of the founders of Brook Farm, and devoted himself for several years to working in its interest. In 1848 he left the colony and returned to Boston, where he engaged in literary work, especially in musical criticism. From 1858 until 1881 he was editor of *Dwight's Journal of Music*. He published several poems, and translations of Goethe and Schiller. His best-known poem is *God Save the State*. He died in Boston, Sept. 5, 1893.

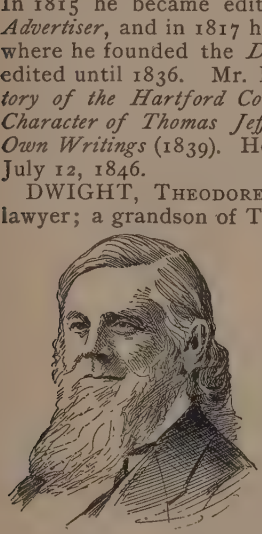
DWIGHT, Nathaniel, an American physician, brother of President Timothy Dwight; born in Northampton, Massachusetts, Jan. 31, 1770; died in Oswego, New York, June 11, 1831. He studied medicine in Hartford, Connecticut; became assistant surgeon in the United States army; afterward practiced in towns of Connecticut and Massachusetts. Dr. Dwight was one of the earliest advocates of the present system of retreats for the insane, prepared the first school geography published in this country, and was author of *The Great Question Answered*, and a *Compendious History of the Signers of the Declaration of Independence*. He died in Oswego, New York, June 11, 1831.

DWIGHT, Sereno Edwards, an American educator; born at Greenfield Hill, Connecticut, May 18, 1786. He was graduated at Yale in 1803, studied law, and practiced successfully in New Haven. Entering the ministry of the Congregational Church in 1816, he was chaplain of the United States Senate in 1816–17, and then

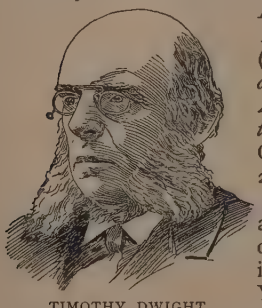
was ordained pastor of the Park Street Church, Boston, where he remained till 1826. He then returned to New Haven, engaged in literary work, and, in connection with his brother Henry, conducted a boarding-school for boys. In 1833 he was chosen president of Hamilton College, resigning the position in 1835. He afterward returned to literary work, and published *Life and Works of Jonathan Edwards* (1830); *A Life of David Brainerd* (1822), and other works. He died in Philadelphia, Pennsylvania, Nov. 30, 1850.

DWIGHT, Theodore, an American journalist, brother of President Timothy Dwight; born in Northampton, Massachusetts, Dec. 15, 1764. He studied law, was admitted to the bar, and as a Federalist engaged in many of the political controversies. After serving in the state senate he was elected to Congress in 1806. He edited the Hartford *Mirror* during the War of 1812, and was secretary of the Hartford convention in 1814. In 1815 he became editor of the Albany *Daily Advertiser*, and in 1817 he removed to New York, where he founded the *Daily Advertiser*, which he edited until 1836. Mr. Dwight published *A History of the Hartford Convention* (1833) and the *Character of Thomas Jefferson as Exhibited in His Own Writings* (1839). He died in New York City, July 12, 1846.

DWIGHT, Theodore William, an American lawyer; a grandson of Timothy Dwight of Yale, was born in Catskill, New York, July 18, 1822. He was graduated in 1840 from Hamilton College; was for some years professor of political economy and law at Hamilton College, and was afterward professor of municipal law in Columbia College, and warden of the law school of that institution. He lectured on law at Cornell University and Amherst. He was active in many reform movements, and was a member of the New York Committee of Seventy of 1874. He wrote extensively on law, and was for a number of years associate editor of the *American Law Register*. He published *Trial by Impeachment* (1867) and *The Influence of James Harrington on American Political Institutions* (1887). He died in Clinton, New York, June 29, 1892.



THEODORE W. DWIGHT.



TIMOTHY DWIGHT.

DWIGHT, Timothy, an eminent American educator, grandson of President Timothy Dwight of Yale, was born in Norwich, Connecticut, Nov. 16, 1828. He was graduated at Yale in 1849, did graduate work at Yale College and studied theology, was for two years a tutor, and in 1856–58 studied in Germany, at Berlin and Bonn; upon his return he became professor of sacred literature in Yale Theological Seminary; and from 1886 to 1898 was president of Yale College. He was one of the American editors of the revised version of the Bible, and was connected editorially with the *New Englander*.

DWIGHT, William Buck, an American scientist; born in Constantinople, Turkey, May 22, 1833; graduated from Yale Scientific School in 1859; a successful teacher at West Point, Connecticut State Normal School, and Vassar College; at the latter becoming professor of natural history in 1878. He spent much of his life in geological investigations in the New York limestones.

DWIGHT, William Theodore, an American clergyman, son of President Timothy Dwight; born in Greenfield Hill, Connecticut, June 15, 1795. He was graduated at Yale in 1813, and after eight years spent as tutor at Yale and in study, was admitted to the Connecticut bar. He entered the ministry of the Congregational Church in 1832, and became one of the most influential clergymen of his denomination. He died in Andover, Massachusetts, Oct. 22, 1865.

DYAKS or DAYAKS, the Malay name for the race which constitutes the bulk of the aboriginal population of Borneo. See Borneo, Vol. IV, p. 58.

DYER, Alexander Byrdie, an American general; born in Richmond, Virginia, Jan. 10, 1815. He was graduated from the United States Military Academy in 1837; was chief of ordnance of the army invading New Mexico in 1846–48, and afterward was in command of the North Carolina arsenal. From 1861 to 1864 he was in command of the Springfield armory, and in the latter year was placed in charge of the Ordnance Bureau in Washington, District of Columbia, with the rank of brigadier-general. In March, 1865, he was brevetted major-general, United States army, for distinguished services. He was the inventor of the Dyer projectile for cannon. He died in Washington, District of Columbia, May 20, 1874.

DYER, Eliphalet, an American jurist; born in Windham, Connecticut, Sept. 26, 1721; died there, May 13, 1807. He was graduated from Yale in 1740, studied law, and was admitted to practice in 1746. During the French and Indian wars he was lieutenant-colonel of a regiment sent against Crown Point in 1775, and afterward was made colonel of a regiment. He was the originator of the plan to establish a Connecticut colony in the valley of the Susquehanna, and in 1763 was sent to England as agent of the company. From 1766 to 1793 he was judge of the Connecticut superior court. A delegate to the first Continental Congress in 1744, he was a member of each succeeding Congress, with the exception of that of 1776 and 1777, and became member of the Committee of Safety in 1775.

DYER, George, an English antiquary and scholar; born in London, March 15, 1755. He studied first at Christ's Hospital, and afterward at Emmanuel College, Cambridge, which he entered

in 1774. He took his degree of B.A. in 1778. During the next 14 years he was tutor and usher, chiefly at Cambridge. In 1792 he settled in London, where he devoted his time to literature, and produced many works of note. Among his works are *History of the University and Colleges of Cambridge* (1814) and *Privileges of the University of Cambridge* (1824). He died in Clifford's Inn, March 2, 1841.

DYER, THOMAS HENRY, an English historian; born in London, May 4, 1804. He visited Athens, Rome and Pompeii, and studied their ancient topography. He was the author of many valuable historical works. Among his publications are *History of Modern Europe* (1864); *Ruins of Pompeii* (1866); and *Ancient Athens* (1873). He died in Bath, England, Jan. 30, 1888.

DYER, WILLIAM TURNER THISTLETON, a British botanist; born in St. James, Westminster, England, July 28, 1843. He was graduated from Oxford in 1873; was professor of botany at the Agricultural College, Cirencester; at the Royal College of Science for Ireland; for the Royal Horticultural Society; and director of the Royal Gardens at Kew. He published *Flora of Middlesex* (1869); *How Crops Grow* (1869); and an English edition of *Sach's Text Book of Botany* (1875).

DYER'S-BROOM, a name given to *Genista tinctoria* of Europe, but introduced into the United States, and naturalized in sterile soil in New England. It is a leguminous plant, low and somewhat shrubby, and with small bright yellow flowers racemed at the ends of the striate-angled green branches. It is also known as "woad-waxen," "whin," "dyer's-weed," and "green-weed." Its specific as well as popular name refers to the fact that its tops were formerly used to furnish a yellow dye.

DYERSBURG, the county seat of Dyer County, western Tennessee, on the north fork of the Forked Deer River, and on the Chesapeake, Ohio, and Southwestern railroad, 45 miles N.W. of Jackson. It contains a carriage factory, foundry, grist-mill, saw-mill, hotels, and newspaper-offices, and manufactures cottonseed-oil, machinery of various kinds and wooden bowls; is supplied with electric lights and city water. Population 1890, 2,009.

DYERSVILLE, a village of Dubuque County, eastern Iowa, situated on Beaver Creek, and on the Chicago, Great Western and Illinois Central railroads, 24 miles W. of Dubuque. It has a flouring-mill and breweries and a very large trade in live-stock. Population 1895, 1,300.

DYER'S-WEED, the common name of *Reseda Luteola*, of the family *Resedaceæ*, native of Europe, but naturalized in the United States. It is a tall herb, with lanceolate entire leaves, and a long spike of yellowish flowers having four petals. Its congener is *R. odorata*, the well-known "mignonette." It also is called "dyer's mignonette" and "weld," and yields a valuable yellow dye.

DYKES, JOHN BACCHUS, a British composer; born at Hull, March 10, 1823; graduated at Cambridge; was ordained in 1847, and appointed precentor of Durham Cathedral in 1849. In 1861 he received the degree of Mus. D. from the University of Durham, and in 1862 was presented to the vicarage of St. Oswald's, in that city. Dr. Dykes was a joint editor of *Hymns Ancient and Modern*, and composed many anthem and hymn tunes, among which are *Lead, Kindly Light; Nearer, My God, to Thee;* and *Jesus, Lover of My Soul.* He died in Durham, Jan. 22, 1876.

DYKES, JAMES OSWALD, an English Presbyterian clergyman and author; was born at Port Glasgow, Scotland, Aug. 14, 1835; graduated at Edinburgh in 1854; studied theology at Heidelberg and Erlangen. He was ordained minister and elected colleague of Dr. Candlish in Free St. George's, Edinburgh. Compelled to resign this charge through feeble health, he visited Australia, where he remained for three years. In 1869 he became minister of Regent Square Presbyterian Church, London, and was appointed principal of the Theological College, Queen Square. His works are *Beatitudes of the Kingdom* (1872); *Relations of the Kingdom* (1874); *From Jerusalem to Antioch* (1874); *Abraham* (1877), *Sermons* (1882 and 1892); and did editorial work of the *British and Foreign Evangelical Review* for a number of years.

DYNAMETER OR DYNAMOMETER. See MECHANICS, Vol. XV, p. 764. For the dynameter used in optics, the double-imaged micrometer, see MICROMETER, Vol. XVI, p. 252; and for the marine dynameter, see HARBORS AND DOCKS, Vol. XI, p. 458.

DYNAMITE-GUN. Nine of these guns are in use by the U. S. Government, and England and Brazil each owns one. Mefford, of Detroit, appears to have been the first to suggest the use of compressed air for discharging dynamite or other high explosive projectiles. Prior to 1890 Lieut. (now Capt.) E. Zalinski became interested in the idea, and developed the gun, which is generally known by his name, with the assistance of Engineers Sewall, Reynolds and Pratt, early experiments being made at Sandy Hook, N. J. Later Capt. John T. Rapieff, of New York, further improved the guns and perfected them. These guns differ from all previous pneumatic guns in that they do not emit their whole supply of compressed air at each discharge, but retain the air in a reservoir, admitting it to the barrel or discharge-tube at a pressure below that in the storage-chamber. The greatest difficulty in the designing of the gun lay in the construction of the valves or ports for admitting the compressed air. It was essential that they should act in a very minute space of time, in order to furnish useful service, and it was also necessary that they should be very strong and exact in action. By a somewhat complicated arrangement, this result was obtained, and the air introduced at an effective pressure of 1,000 pounds, the pressure being increased as the projectile moved along the tube. In this manner dynamite has been thrown a distance of 6,000 yards, and those interested in its manufacture are developing means for increasing this range.

The Maxim-Schupphaus system of throwing aërial torpedoes from guns by means of a special powder which starts the projectile with a low pressure and increases the velocity by keeping the pressures well up throughout the whole length of the gun, is the most recent claimant for recognition in the field of dynamite-guns. It is possible to use powder in this gun, of a sort invented for the purpose by Dr. Schupphaus. This special powder is made up in the form of cylindrical sticks perforated lengthwise, and capable of giving out the gases at the forward ends while burning. The initial pressure given out by this powder on ignition in a 30-foot gun is calculated to be only one sixteenth of the pressure applied to the projectile just before it leaves the muzzle. This great acceleration of speed, combined, with a safe initial pressure, is productive of a long range, and 10 miles has been claimed for this gun, though this remains to be proven. The explosive used with this gun is maximite, which owes its force principally to nitroglycerine. A 20-inch gun 30 feet long is being manufactured to test this system on a large scale.

A new form of gun for using powder to discharge dynamite cartridges has been built on an experimental scale. It has a tube bent into a flat coil, so that it appears like three tubes laid parallel and connected by bends. The dynamite cartridge is placed in the last straight section of the tube and the powder is fired in the first straight section. As a consequence, the expanding gases have to travel through the first and second tube sections and around two bends before reaching the dynamite. Thus the shock is regulated so that the dynamite can be thrown as readily as with compressed air, while the force so obtainable is greater than can be had through any arrangement of valves for letting in compressed air.

C. H. Cochrane.

DYNAMO, Alternating Current. See Electricity, § 85, in these Supplements.

DYNAMO-ELECTRIC MACHINE. See Lighting, Vol. XIV, pp. 630–632; and Electricity, § 79, in these Supplements.

DYNE. See Energy, Vol. VIII, p. 206.

DYSPNŒA. See Respiration, Vol. XX, p. 485.

DYTISCIDÆ, a genus of water-beetles. See Coleoptera, Vol. VI, pp. 128–130.

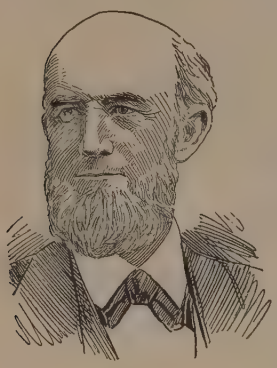
DYVLETT GHYREY, a Crimean khan, the last who ruled without Russian protection. See Crimea, Vol. VI, p. 587.

DZIGGETAI or DZEGGETAI, a wild ass, more horse-like than the others. It is probably the hemionus ("half-ass") of Herodotus and Pliny. It inhabits the plateaus of central Asia. The dziggetai, the kiang and the koulan are regarded by many naturalists as varieties of the same species. See Horse, Vol. XII, p. 175; and Ass, Vol. II, p. 717.

E

EADS—EAMES

EADS, James Buchanan, an American engineer; born in Lawrenceburg, Indiana, May 23, 1820. At the age of 13 he settled in St. Louis, and in 1842 constructed a diving-bell boat. Afterward he built several boats for raising large steamers. In 1845 he established the first glass-works west of the Mississippi. In 1861 he constructed eight iron-clads in one hundred days, and these steamers were employed in the capture of Fort Henry in February, 1862. Later he built many other iron-clads and mortar-boats. For seven years from 1867 he was engaged in the construction of the steel arch bridge across the Mississippi River at St. Louis. Subsequently he deepened the Southern Pass at the mouth of the Mississippi by means of jetties, and outlined a plan to deepen the river from the Gulf of Mexico to the mouth of the Ohio. Congress appropriated a large sum of money for the work, but discontinued the appropriation, although the plan had been shown to be practicable. He afterward formed a company to build a ship-railway across the Isthmus of Tehuantepec. He was connected with various other enterprises. He was the first American to receive the Albert medal of the British Society of Arts, which was awarded to him in 1884. He died in Nassau, Bahama Islands, March 8, 1887. See Jetties, Vol. XX, p. 580.



JAMES B. EADS.

EAGLE, Order of the Black, in Prussia, an order founded by the Elector of Brandenburg, on Jan. 17, 1701, the day of his coronation as king of Prussia. The number of knights, in addition to the princes of the royal family, was originally thirty, but now is unlimited. They must at their nomination be at least thirty years of age, and their noble descent for four generations is necessary. The insignia of the order consists of an octagonal cross of blue enamel, and eight black eagles displayed between the arms of the cross. The cross is suspended by a broad ribbon of orange color across the left shoulder, and it is accompanied by an embroidered silver star fastened on the left breast. Knights of the Black Eagle are likewise knights of the Red Eagle, first-class. The Order of the Red Eagle was originated in 1734 by the Markgraf Georg Frederick Charles, and was raised to the second rank by Frederick William II, in 1791. Only those having this order can receive the cross of the Black Eagle. The decoration consists of a white Maltese cross surmounted by a royal crown with the Brandenburg red eagle in the corner. Both decorations are for meritorious services, and are granted by the emperor.

EAGLE–HAWK (*Morphuus* or *Spizætus*), a genus or subgenus of *Falconidæ*, of the eagle group, but consisting of species of comparatively small size, and characterized by short wings, long, slender legs (*tarsi*), and comparatively feeble toes and claws. They are natives of warm climates, chiefly of South America, but also of Africa and the East Indies.

EAGLE–OWL (*Bubo*), a genus of the owl family (*Strigidæ*), characterized by a somewhat incomplete facial disk, two tufts of feathers (*horns* or *egrets*) of considerable size on the head, ears with small openings (*conches*), legs and toes covered with feathers, short, strong curved bill, and long, curved, sharp claws. To this genus belong the largest of the nocturnal birds of prey. The eagle-owl of Europe (*Bubo maximus*) is little inferior in size to the golden eagle, and preys on quardupeds such as hares, rabbits and young deer, and on grouse, partridges and other kinds of game. It seizes its prey with its feet, and seldom touches it with the bill till its struggles are over. It is an inhabitant of many parts of Europe and Asia, but it is only an occasional visitor in Britain. The eagle-owl of America (*B. Virginianus*), the Virginian horned owl, or great horned owl, is very similar to the species just noticed, but of inferior size, although still a large and powerful, as it is also a bold, bird. It carries off with ease almost any inhabitant of the poultry-yard. It is found in nearly all parts of America. See Owl, Vol. XVIII, p. 90.

EAGLE PASS, a city and the capital of Maverick County, southern Texas, on the Rio Grande River, and on the Southern Pacific railroad, 248 miles S.W. of Austin, in a coal-mining, wool-growing and stock-raising district. Population 1890, 2,729.

EAGLE–RAY. See Ray, Vol. XX, p. 300.

EAGLE ROCK, a village of Bingham County, southeastern Idaho, on the Snake River, and on the Union Pacific railroad. It is the market place for a large part of Snake River valley. Population 1890, 938.

EAGLE–WOOD, the wood of *Aquilaria ovata*, a tree of tropical Asia, of the family *Thymelæaceæ*, used as incense. See Aquilaria, in these Supplements; and Cambodia, Vol. IV, p. 725.

EAGRE or EAGER. See Bore, in these Supplements.

EAMES, Charles, an American lawyer; born in New Braintree, Massachusetts, March 20, 1812. He was graduated from Harvard in 1831, and studied law in New York City, but did not enter

into practice on account of poor health. He went into journalism as one of the editors of the Washington *Union*. He was commissioner to the Sandwich Islands and minister to Venezuela. He resigned his office in 1858 and engaged in the practice of law. He established a reputation as an admiralty lawyer, and had an extended practice at the time of his death in Washington, March 16, 1867.

EAMES, EMMA, an American prima donna. See STORY, in these Supplements.

EAR, DEVELOPMENT OF. See SENSE-ORGANS, in these Supplements.

EAR, DISEASES OF. See EAR, Vol. VII, pp. 594, 595.

EARLE, PLINY, an American physician; born in Leicester, Massachusetts, Dec. 31, 1809. He was physician at Bloomingdale Asylum (1844–49), and superintendent of the state hospital for the insane at Northampton, Massachusetts, for more than twenty years. He first introduced the system now in general use of lecturing to the insane on topics of scientific and general interest. He was a prominent member of the American Medical Association and other societies, and was a frequent contributor to medical journals. He published *The Curability of Insanity* (1887), and a number of other works in regard to the insane. He died in Northampton, Massachusetts, May 18, 1892.

EARLHAM COLLEGE, a co-educational institution maintained by the Society of Friends,

LINDLEY HALL, EARLHAM COLLEGE.

at Richmond, Indiana. It was organized first in 1859. In 1895 there were 15 in the faculty, 366 students, and the institution possessed a library of about 6,000 volumes. Since organization, in 1895, 349 had been graduated. In addition to the regular collegiate courses, of which there are eight, instruction is given in music and the fine arts. The college is especially fortunate in its museums and laboratory facilities.

EARLL, ROBERT EDWARD, an American naturalist; born in 1853, in Waukegan, Illinois. Graduated at Northwestern University in 1877, and from that time until his death was connected with the Smithsonian Institution at Washington, and the National Museum. He did his first work with the Fish Commission, and represented the United States at the International Fisheries Exhibition in London in 1883, and as curator of the National Museum had charge of the museum's exhibits at the expositions at Louisville and New Orleans in 1884 and 1885; Cincinnati, 1888; Chicago, 1893; and Atlanta, 1895. He died in Washington, District of Columbia, March 20, 1896.

EARLVILLE, a city and railroad center of La Salle County, northern central Illinois, 70 miles W.S.W. of Chicago, on the Chicago, Burlington and Quincy and Chicago and Northwestern railroads. It has manufactories of carriages and plows. It also has considerable trade in the agricultural products of the vicinity. Population 1890, 1,058.

EARLY, JUBAL ANDERSON, a Confederate soldier; born in Franklin County, Virginia, Nov. 3, 1816. In 1837 he graduated from West Point and was appointed lieutenant of artillery, but in a short time he resigned from the army, studied law and served in the legislature of Virginia. In the war with Mexico he became major of a volunteer regiment. At the opening of the Civil War he entered the Confederate service as a colonel.

JUBAL A. EARLY.

He was soon advanced to the rank of brigadier-general. In May, 1863, he held the lines in Fredericksburg, while General Lee was engaged with General Hooker at Chancellorsville. In July he commanded a division at Gettysburg. In 1864 he commanded in the valley of the Shenandoah, where at first he was successful, but finally was routed by General Sheridan at Cedar Creek. Custer beat him at Waynesboro in March, 1865, and he was removed from command. After the close of the war General Early went to Europe, and on his return resumed the practice of law in Richmond. From there he went to New Orleans, where, with General Beauregard, he was for some years manager of the Louisiana state lottery. He latterly lived in Lynchburg, Virginia. In 1867 he published *Memoirs of the Last Year of the War*, and in 1883 published *Jackson's Campaign Against Pope in 1862*. He died in Lynchburg, Virginia, March 2, 1894.

EARNEST. See SALE, Vol. XXI, p. 207.

EAR-SHELL, the common name of the mollusks of the genus *Haliotis*. See ABALONE, in these Supplements.

EARTH-ALMOND OR CHUFA, a species of sedge (*Cyperus esculentus*) whose tuberous roots are used in the south of Europe as a vegetable, and in making a popular drink called *orchatas de chufas*. It has been successfully grown in the warmer parts of the United States, and has been recommended as a substitute for coffee.

EARTH-HOUSES, EIRD-HOUSES OR YIRD-HOUSES, the name which seems to have been generally given throughout Scotland to the primitive underground buildings which in some

places are called also "Picts' Houses," and in others, it would appear, "weems," or caves. The earth-house, in its simplest form, is a single irregularly shaped chamber from 4 to 10 feet in width, from 20 to 60 feet in length and from 4 to 7 feet in height, built of unhewn and uncemented stones, roofed with unhewn flags, and entered from near the top by a rude doorway, so low and narrow that only one man can slide down through it at a time. See ARCHÆOLOGY, Vol. II, p. 338, 339; and ARCHITECTURE, Vol. II, p. 384.

EARTH-NUT, a common name given to the edible tubers or underground parts of many plants, as seeds of *Arachis hypogœa*, whose pods ripen underground, and sometimes are called earth-nuts, or "ground-nuts," or, far more commonly, "peanuts," or in the South, where they are cultivated, "goober peas," or "goobers"; tubers of species of BUNIUM (q.v., in these Supplements), an umbelliferous plant of Europe; tubers of various species of *Cyperus;* tubers of *Erigenia bulbosa*, an early spring umbellifer, otherwise called "turkey pea" or "pepper-and-salt"; tubers of *Apios tuberosus*, a low, creeping leguminous plant, etc.

EARTHS, in chemistry, a class of substances which were regarded by the alchemists and older chemists as elementary, and which are insoluble in water. The earths *proper* are now known to be compound, consisting of a metal in combination with oxygen. The list includes alumina, glucina, zirconia, thoria, didymia, lantana, ceria, yttria, terbia and erbia. They do not alter vegetable colors, are soluble in acids, and are precipitated from their solutions by ammonia, potash or soda.

EARTHWORK. See FORTIFICATION, Vol. IX, pp. 430–440.

EARTHWORM (*Lumbricus*), a genus of *Annelida*, of the order *Terricolæ*. There are many species, all of them pretty closely resembling in characters and habits the common earthworm or dew-worm (*L. terrestris*). It has no head distinct from the body, no eyes, no antennæ, nor any organs external to the rings of which its body is composed, except minute bristles pointing backwards, of which each ring bears four pairs, and which are of use in its locomotion. It sometimes attains to nearly a foot in length, and more than one hundred and twenty rings have been counted in its body. The end at which the mouth is situated is pointed and the tail is flattened, while the general form is cylindrical. The mouth consists merely of two lips, the upper lip elongated; there are no teeth nor tentacles, and the worm subsists by swallowing fine particles of the soil, from which its digestive organs extract the digestible matter, the rest being voided often in little intestine-shaped heaps, called *worm-casts*, on the surface of the ground. The locomotion of the earthworm is effected by means of two sets of muscles, which enable it to contract and dilate its rings, its bristles preventing motion backward, and the whole muscular effort thus resulting in progress, while the expansion of the rings, as it contracts the anterior segments, and draws forward the hinder parts, widens a passage for it through earth whose particles were close together before. Earthworms are thus of very great use, their multitudes continually stirring and loosening the soil through which they work their way, and moles, pursuing them for food, stir and loosen it still more, while worm-casts gradually accumulate on the surface to form a layer of the very finest soil, to which it is supposed that the best old pastures, in a great measure, owe their high value. See WORM, Vol. XXIV, p. 677.

EASDALE, a small isle on the west coast of Argyleshire, central western Scotland, in the Firth of Lorne, 10 miles S.S.W. of Oban. It contains one and a half square miles, and is situated in Kilbrandor parish.

EAST AFRICA, BRITISH. See AFRICA, in these Supplements.

EAST AFRICA, GERMAN. See AFRICA, in these Supplements.

EAST AFRICA, PORTUGUESE. See AFRICA, in these Supplements.

EAST AURORA, a village of Erie County, western New York, situated in a rich farming section, on the Western New York and Pennsylvania railroad. It is 17 miles S.E. of Buffalo, and has the residences of many Buffalo business men. Population 1890, 1,582.

EAST BRADY, a village of Clarion County, central western Pennsylvania, on the Allegheny River, and on the Allegheny Valley railroad, 70 miles N. of Pittsburg. The Brady Iron Works are just across the river, and furnish employment to 1,500 persons. This village is near the Butler County oil regions, and considerable oil is brought in pipe-lines to the village, and then shipped. Population 1890, 1,228.

EAST BRIDGEWATER, a post township of Plymouth County, eastern Massachusetts, 25 miles S.E. of Boston, on the Satucket River, and on the New York, New Haven and Hartford railroad. It has excellent water-power, and is a thriving manufacturing place. Among the articles made here are brick, cotton-gins, iron, chains, nails, boots and shoes. Population 1890, 2,911.

EASTBURN, MANTON, an American Protestant Episcopal bishop; born in Leeds, England, Feb. 9, 1801. He was graduated from Columbia in 1817. He was ordained in 1822, and for the succeeding five years was assistant minister in Christ Church, New York. In 1827 he became rector of the Church of the Ascension. In December, 1842, he was consecrated assistant bishop of the diocese of Massachusetts, and two months later became bishop. He published several works on religious topics; among them, *Essays and Dissertations on Biblical Literature* (1829). He died in Boston, Massachusetts, Sept. 12, 1872.

EAST CAPE, the name of the most easterly headlands of the island of Madagascar, of the North Island of New Zealand, and of Siberia, or Asiatic Russia. The first is in lat. 15° 20′ S., and long. 50° 15′ E.; the second in lat. 37° 40′ S., and long. 178° 40′ E., being almost precisely the

antipodes of Carthagena, in Spain; and the third is that extremity of the Old World which is nearest to the New, being separated by Bering's Strait from Cape Prince of Wales in America. It is in lat. 60° 6′ N., and long. 169° 38′ W.; or rather, to follow the natural reckoning, 190° 22′ E. It is a bold, rocky promontory of syenite, almost cut off from the mainland by swamps and shallow lakes. On the north side is the village of Uédle, comprising some eighty or ninety rude huts, with a population of about two hundred and fifty. The name of East Cape is applied, also, to the southeastern extremity of New Guinea, in Goschen Strait.

EASTER ISLAND. See POLYNESIA, Vol. XIX, p. 428; and RAPANUI, Vol. XX, p. 273.

EASTERN ARCHIPELAGO. See INDIAN ARCHIPELAGO. Vol. XII, pp. 815–820.

EASTERN EMPIRE. See *Byzantine Empire*, under GREECE, Vol. XI, pp. 114–120.

EASTERN ROUMELIA. See TURKEY, Vol. XXIII, p. 652.

EASTERN SHORE. See MARYLAND, in these Supplements.

EAST GREENWICH, a city and the capital of Kent County, central Rhode Island, on Greenwich Bay, and on the New York, New Haven and Hartford railroad, 14 miles S. of Providence. It has an academy under the supervision of the University of Boston, and a free library. It manufactures cotton and woolen goods, and has a print-works. Population 1895, 3,096.

EAST HADDAM, a township of Middlesex County, south-central Connecticut, on the Connecticut River. It contains a music seminary, three brittania-shops, and thirteen cotton-mills. Population 1890, 2,599.

EAST HAMPTON, a manufacturing town and railroad junction of Hampshire County, western Massachusetts, five miles S.W. of Northampton, on a pretty lake in the Holyoke range. The place contains Williston Seminary for young men, and a public library, and has manufactories of pumps, vulcanized rubber, suspenders, cotton yarns and buttons. Population 1895, 4,790.

EAST HUMBOLDT MOUNTAINS, a high range of mountains in Elko County, Nevada, extending north and south, some of whose peaks exceed 12,000 feet in height. Ruby Valley is on the east and Huntingdon Valley on the west, while Secret Valley and Fremont Pass cut the range.

EAST INDIA COMPANIES, companies organized in the seventeenth and eighteenth centuries for the promotion of trade and planting of colonies. These companies were formed by the governments of Great Britain, Holland, Denmark, France and Sweden. The company was granted a charter, which generally gave it a monopoly of the colonial and foreign trade within a certain district. Over that district the company was given exclusive control, and ruled without interference on the part of the home government. It was permitted to organize armed forces and equip navies for the protection of its rights. The clash between companies of different nationalities generally resulted in war between the governments. In some cases the companies paid an annual tax to the government, but usually no such payment was demanded. The first company organized for the East Indian trade was that of England, in 1600. It was chartered by Queen Elizabeth, as "The Governor and Company of London Merchants trading with the East Indies." This company made settlements in India, and established itself to such an extent that it became the most powerful body in its time. In 1784 Parliament appointed a government board of control, and in 1858 the company ceased its active existence, when India was made a crown province. The Dutch company was formed in 1602. It vied with the British company for the supremacy of the East Indian seas. It was a great power until 1674, when, wearied by a constant warfare, it began to decline, and in 1795 its existence was at an end. Denmark organized a company in 1618, which led a varied existence, with several disruptions, until 1729, when its properties were turned over to the state. France founded her company in 1664. It lived until 1769, when the government assumed control of its properties. Sweden did not organize for the Indian trade until 1741, and reorganized the company on government basis in 1806. The British company made the larger part of its settlements in India proper, at Calcutta, in Bengal, in Bombay and Madras. The Dutch company worked in Java, Sumatra and neighboring islands, which to-day are included in the Dutch East Indies. France and Denmark maintained stations on the Coromandel Coast. See ASIA, Vol. II, pp. 701, 702; and GEOGRAPHY, Vol. X, pp. 185, 186.

EAST LIVERPOOL, a city of northeastern Ohio, near the eastern boundary of the state, on the Ohio River, and in Columbiana County. It is on the Cleveland and Pittsburg railroad, 24 miles above Steubenville, and 44 miles W.N.W. of Pittsburg, Pennsylvania. Its chief industry is the manufacture of stoneware, earthenware, terra-cotta, granite-ware, and yellow-ware; it has thirty potteries. Population 1880, 5,568; 1890, 10,956; 1892, 14,000.

EASTMAN, a town and the capital of Dodge County, southern central Georgia, on the Southern railroad, and between the Little Ocmulgee River and Sugar Cox Creek. The land about is covered with trees and stock-farms, and large quantities of yellow pine, cotton and wool are shipped. Population 1890, 1,082.

EASTMAN, ELAINE GOODALE, an American poetess; born in Mount Washington, Massachusetts, Oct. 9, 1863. She is a sister of Dora Read Goodale, and with that sister published *Apple Blossoms, Verses of Two Children* (1878); *In Berkshire with the Wild Flowers* (1879); and *Verses from Sky Farm* (1880). She has published, independently, *The Journal of a Farmer's Daughter* (1881). Mrs. Eastman, as Elaine Goodale, early in life was interested in Indian education and was for a time teacher at the Hampton (Virginia) Indian

Institute, and at the White River Camp school, in South Dakota. She was married in 1891 to Dr. C. A. Eastman, a full-blooded Sioux Indian.

EASTMAN, John Robie, an American astronomer; born in Andover, New Hampshire, July 29, 1836; graduated at Dartmouth in 1862. He became mathematician at the United States Naval Observatory in Washington, with the rank of naval commander, and is a fellow of the American Association for the Advancement of Science, and a member of many scientific societies. From 1872 to 1882 he edited the reports of the Naval Observatory.

EASTON, a town and the capital of Talbot County, eastern Maryland, situated in a fine fruit region, on a navigable branch of the Great Choptank River. It has several schools, an orphan asylum, gas-works, peach-canning and fruit-drying establishments, and manufactories of lumber, farm-implements and castings. Population 1895, 2,939.

EASTON, a manufacturing township of North Bristol County, eastern Massachusetts, on the New York, New Haven and Hartford railroad. It produces boots, shoes, thread, shovels and hinges. Population 1895, 4,452.

EASTON, a city of eastern Pennsylvania, and county seat of Northampton County (see Vol. VII, p. 616). Easton is delightfully situated on the right bank of the Delaware River, at the mouth of the Lehigh. A chain bridge across the Delaware connects it with Phillipsburg, New Jersey. It is an important railroad center, being on the Delaware, Lackawanna and Western, the Lehigh Valley, the New Jersey Central, the Belvidere Delaware, the Easton and Amboy, and the Lehigh and Susquehanna railroads. It is the outlet of a rich agricultural region, and has various manufactories, as well as iron-works, tanneries, machine-shops and paint-works. Lafayette College (Presbyterian) is located at Easton. Population 1880, 11,924; 1890, 14,481.

EAST ORANGE, a pleasant village of Essex County, northeastern New Jersey, adjacent to Newark, located 12 miles from New York City, on the Erie and Delaware, Lackawanna and Western railroads. It contains the handsome villas of many New York business men. Population 1895, 17,927.

EASTPORT, a port of entry of Washington County, eastern Maine, situated on Moose Island, one of the small islands of Passamaquoddy Bay, which receives the St. Croix River, the boundary between the United States and British America. The harbor of Eastport is deep enough for the largest vessels, and the tide rises within it to a height of 25 feet. The place is largely engaged in the fisheries and in ship-building, and has some repute as a summer resort. Population 1890, 4,908.

EAST RIVER, the strait between New York harbor and Long Island Sound. It is twenty miles long and separates New York City on the west from Brooklyn on the east. Its narowest part is the Hurlgate, or Hellgate, which is about the middle of its course. Here the rocks which once obstructed the passage have been removed by blasting. The name—clearly a misnomer for an arm of the sea—is convenient, as contrasted with the North River, or Hudson, and may have arisen from the river-like action of the tides—an action so powerful as to have here and there materially deepened the channel.

EAST ST. LOUIS, a city of St. Clair County, southwestern Illinois, located on the Mississippi River, opposite St. Louis, Missouri. A steel bridge across the Mississippi connects the two cities. East St. Louis is an important railroad center, no less than ten railways either passing through or terminating in the city. The largest stock-yards in the United States, those of the National Stock Yards' Company, are located here. They comprise 650 acres. The city contains extensive car-shops, foundries, rolling-mills, nail factories, gas-works, soda factory, breweries, etc. The Howe Literary Institute (Baptist) is located here. There is also a high school, several graded public schools, an academy (Roman Catholic), and a public library containing 5,000 volumes. This city was visited, May 27, 1896, with a tornado, which killed over five hundred people and damaged property to the amount of about $10,000,000. Population 1880, 9,185; 1890, 15,169.

EAST WEYMOUTH, a station in Weymouth township, Massachusetts, on the New York, New Haven and Hartford railroad, 30 miles S.E. of Boston. Boot and nail factories are situated here. Population of township 1890, 10,866.

EASTWICK, Edward Blackhouse, a British Orientalist; born in Berkshire, at Warfield, March 13, 1814. After his graduation at Oxford, he entered the service of the East India Company in 1836, and was sent to Kathiawar, India. He entered into the political organization of the district, and made a study of the language and literature. He was appointed assistant political secretary in the India Office in 1860. He was, in 1860–63, secretary of legation in Persia. He published *Life of Zoroaster* (1843); *Arrival of the Parsees in India* (1845); a *Hindustani Grammar* (1847); and other works. He died at Ventnor, Isle of Wight, July 16, 1883.

EATON, a village and the capital of Preble County, western Ohio, situated on Seven-mile Creek, and on the Pittsburg, Cincinnati, Chicago and St. Louis railroad, 53 miles N. of Cincinnati. It is occupied entirely with farming and shipping produce. Population 1890, 2,934.

EATON, Daniel Cady, an American botanist; born in Fort Gratiot, Michigan, Sept. 12, 1834. He was graduated from Yale in 1857, and afterward spent several years in post-graduate study at Harvard. From 1864 to the time of his death he was professor of botany at Yale. He made a special study of ferns, and made field researches in various parts of the United States. He contributed the pages on ferns to *Gray's Manual* (1867) and Chapman's *Flora of the Southern States* (1860); and he has published, among other works,

The Ferns of North America (1879–80). He died in New Haven, Connecticut, June 29, 1895.

EATON, Dorman Bridgman, an American lawyer and civil service commissioner; born in Hardwick, Caledonia County, Vermont, June 27, 1823. He was graduated from Harvard Law School in 1850, but received his collegiate education at the University of Vermont. He was admitted to the bar of New York, and began the study of the civil service systems of Europe, and visited various countries in his research. He was appointed a member of the first United States civil service commission in 1883, and served until 1886. Among his works on civil service may be mentioned *The "Spoils" System and Civil Service Reform* (1881); *The Term and Tenure of Office* (1882); and *Secret Sessions of the Senate* (1886).

EATON, Edward Dwight, an American educator and Congregational clergyman; born in Lancaster, Wisconsin, Jan. 12, 1851; graduated at Beloit College, Wisconsin, in 1872, and at Yale Divinity School in 1875; was pastor of Congregational churches in Newton, Iowa; and Oak Park, Illinois; and in 1886 became president of Beloit College, Wisconsin.

EATON, George Washington, an American educator; born in Anderson, Pennsylvania, July 3, 1804; graduated from Union College in 1829, and ordained into the ministry of the Baptist Church; in 1831 became professor of ancient languages in Georgetown College, Kentucky. From 1833 to 1850 he was connected with Hamilton College, now Madison University, first as professor of mathematics, and later of ecclesiastical and civil history. From 1850 to 1861 he was president of Madison University, and until 1871 president of Hamilton Theological Seminary. He died in Hamilton, New York, Aug. 3, 1872.

EATON, John, an American educator; born in Sutton, New Hampshire, Dec. 5, 1829; was graduated from Dartmouth in 1854; from 1854 to 1859 engaged in public school work in Cleveland and Toledo, Ohio; entered the ministry of the Presbyterian Church in 1861; served as chaplain in the Union army in the Civil War; in 1862 was appointed superintendent of contrabands; brevet brigadier-general of volunteers in 1865; in 1866–70 assistant commissioner of the Freedmen's Bureau; United States commissioner of education in 1870–86; and in 1886 became president of Marietta College, Ohio, and remained there until 1891. He was the representative of the United States Department of the Interior at the Centennial Exposition.

EATON, John Henry, an American politician; born in Tennessee in 1790. He was elected to the United States Senate from Tennessee, and was Secretary of War under Andrew Jackson in 1829–31. The objections made by wives of other members of the Cabinet to associating with his wife created a public scandal. President Jackson warmly espoused Mrs. Eaton's cause, and the trouble ended in a disruption of the Cabinet. Mr. Eaton was afterward governor of the territory of Florida; and from 1836 to 1840, minister to Spain. He died in Washington, District of Columbia, Nov. 17, 1856.

EATON, William, an American soldier; born in Woodstock, Connecticut, Feb. 23, 1764; died in Massachusetts, June 1, 1811. He served as consul to Tunis from 1799 to 1803, and as United States naval agent to the Barbary States from 1803 to 1805; and in the latter capacity joined an expedition which stormed and captured Derne, an important Tripolitan town, in 1805. Eaton was one of the chief witnesses against Aaron Burr on his trial for treason.

EATON, William Wallace, Senator; born in Tolland, Conn., Oct. 11, 1816: served in the state legislature in 1847–48, in the senate in 1850, and again in the lower house in 1853–75. In 1875 he became United States Senator, and served until March, 1881. In 1884–85 he was a member of Congress. Died at Hartford, Conn., Sept. 21, 1898.

EATON, Wyatt, an American artist; born in Philipsburg, Canada, May 6, 1849; studied under Gérôme in Paris, and in New York. Residing in New York city, he became known as a portrait-painter, the best example of this kind of work being a portrait of William Cullen Bryant. Among his works are *Farmer's Boy* (1870); *Reverie* (1875); *Boy Whittling* (1879); and a portrait of Mrs. R. W. Gilder. Died at Newport, R. I., June 7, 1896.

EATON RAPIDS, a city of Eaton County, central southern Michigan, on Grand River, 24 miles N.W. of Jackson, on the Michigan Central and Lake Shore and Michigan Southern railroads. It is a railroad junction, and is noted for its mineral magnetic springs. Population, 1895, 2,157.

EATONTON, a city and the capital of Putnam County, north-central Georgia, on the Middle Georgia and Atlantic railroad, 21 miles N.W. of Milledgeville. Its industry is derived from cotton raising and shipping. Population 1890, 1,682.

EAU CLAIRE, a city of western central Wisconsin, and capital of Eau Claire County, situated at the head of steamboat navigation on the Chippewa River, and at the mouth of the Eau Claire River. It is the center of important lumber interests, and has excellent railroad facilities, being on the Chicago, Milwaukee and St. Paul, the Chicago, St. Paul, Minneapolis and Omaha, and the Wisconsin Central railroads. The two rivers divide the city into three sections. The public buildings are the courthouse and city hall. The streets are well paved and lighted with gas and electricity. The industrial establishments include saw-mills, flouring-mills, grain-elevators, iron-foundries, paper-mills, machine-shops, etc. Lumber is the principal article of export. Population 1880, 10,119; 1895, 18,637.

EAU CRÉOLE, a fine liqueur, made in Martinique, by distilling the flowers of the Mammea apple (*Mammea Americana*) with spirit of wine.

EAU DE JAVELLE, a bleaching fluid and antiseptic, containing salt, potassium hypochlorite and potassium carbonate. It is a powerful poison when administered to human beings.

EAUX BONNES, a watering-place of southwestern France, in the department of Basses-

Pyrénées, situated 20 miles S.S.E. of Oléron. It stands in a narrow gorge surrounded by rocks, and is much frequented on account of its hot sulphurous springs, which are four in number, and are used for bathing purposes. Their temperature does not exceed 91° F.

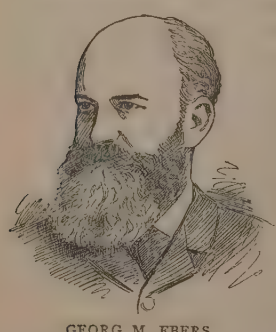
EAUX CHAUDES, Les, three miles S.W. of Eaux Bonnes, and a similar place of resort. The springs of both places have the same properties. See Pyrenees, Vol. XX, p. 127.

EBELING, Christoph Daniel, a German geographer; born in Hildesheim, Germany, Nov. 20, 1741. In 1769 he became a teacher in the commercial school in Hamburg, and in 1784 professor of Greek and history in the gymnasium in that city. He contributed extensively to various periodicals, and published several works on history and geography. He possessed a wide reputation for his knowledge of the geography of America. His extensive collection of books and papers is in the library of Harvard University. His principal publication was *Geography and History of North America* (1799). He died in Hamburg, June 30, 1817.

EBENACEÆ, a family of dicotyledonous plants, consisting of trees and shrubs, with alternate leathery leaves and axillary flowers, which are gamopetalous, somewhat leathery, and generally unisexual, the fruit fleshy. Numerous species are known, mostly tropical, but a few are natives of temperate countries. The wood is, in general, remarkable for its hardness, as the different kinds of ebony and other species of *Diospyros;* and on account of this quality, even that of species which never attain the ordinary size of timber trees, is sometimes accounted valuable. The only American representative is *Diospyros Virginiana*, the well-known "persimmon," or "date-plum."

EBENSBURG, a borough and the capital of Cambria County, southwestern central Pennsylvania, on the Pennsylvania railroad, 12 miles W. of Altoona. It is in a heavily timbered country, which is also very beautiful; hence it is popular as a health and summer resort. Its industries are iron-working, wool-weaving and tanning. Population 1890, 1,202.

EBERNBURG, a small town in the Bavarian palatinate, situated about 20 miles S.W. of Mainz, at the junction of the Alsenz with the Nahe. It is of interest because here was a castle of Franz von Sickingen, which was used as a place of refuge by Melanchthon and other reformers.



GEORG M. EBERS.

EBERS, Georg Moritz, a German Egyptologist and novelist, was born at Berlin, March 1, 1837. At the universities of Göttingen and Berlin he made Egyptology his principal study, and later he visited the principal museums of Egyptian antiquities in Europe. In 1870 he was called to Leipsic as professor. During his sojourn in Egypt, in 1872–73, he discovered the Papyrus *E*, known under his name, a very important document, on account of the insight it gives into the language and culture of the ancient Egyptians. In 1876 he was stricken with paralysis, and at once occupied himself with imaginative composition, as a relief from ennui, the state of his health precluding more serious studies, his first work being *An Egyptian Princess* (1864). Of his novels, *Uarda: A Romance of Ancient Egypt* (1877), is the most popular. It was followed by *Homo Sum* (1878); *The Sisters* (1880); *The Emperor* (1881); *The Burgomaster's Wife* (1885); *Serapis* (1885); *Cleopatra* (1894); *In the Fire of the Forge* (1895); and *Arachne* (1898). His Egyptian stories afford evidence of scientific study. His scientific works include *Through Goshen to Sinai* (1872); *Papyros Ebers* (1875); *Egypt: Descriptive, Historical, and Picturesque* (1878); *Coptic Art* (1892). Died in Munich, Aug. 8, 1898.

EBERT, Adolph, a German philologist; born in Cassel, Germany, June 1, 1820. After studying at Göttingen, Marburg, Leipsic and Berlin, he was for a time professor of Romance literature at Marburg, and from 1862 until his death he wrote numerous essays on Spanish and Italian literature in the *Year Book of Romance Literature.* His best-known and most valuable work is *A General History of the Literature of the Middle Ages* (1874). Others of his writings are *A Study of the Sources of the History of Spain* (1849) and a *Manual of Italian Literature* (1854). He died in Leipsic, July 1, 1890.

EBERT, Karl Egon, an Austrian poet; born at Prague, Bohemia, June 5, 1801. He was educated there and at Vienna, and from 1825 to 1857 was librarian at Donaueschingen. His chief works are *Poems* (1824); *Wlasta: A Bohemian National Heroic Poem* (1829); and *The Cloister: A Narrative Idyl* (1833). He died at Prague, Oct. 24, 1882.

EBONITE. See India Rubber, Vol. XII, p. 842.

ECCENTRIC, in machinery. See Mechanics, Vol. XV, p. 761.

ECCENTRICITY, a mathematical term which, in the older mathematical works, is used as the name of half the distance between the foci of an ellipse or hyperbola. More properly, the eccentricity is the *ratio* of half the distance between the foci to the semi-major axis.

ECCLESFIELD, a township in the West Riding of Yorkshire, northern England, five miles N. of Sheffield. The chief manufacture is that of cutlery, but flax, linen and nails are also branches of industry. There are coal and iron mines in the vicinity. Population 1891, 25,890.

ECCLESIOLOGY, the name which has been given, in the British Islands, to the study of church architecture and decoration. It has a literature of its own, including a monthly journal, called *The Ecclesiologist.* There are societies for promoting its study, one of which, "The Ecclesio-

logical Late Cambridge Camden Society," has published *A Handbook of English Ecclesiology* (London, 1847).

ECCLESTON, SAMUEL, an American Roman Catholic archbishop; born in Kent County, Maryland, June 27, 1801. He was ordained in 1825, and later studied in Paris. On his return he became first vice-president, then president, of St. Mary's College. In 1834 he became archbishop of Baltimore. He died in Georgetown, District of Columbia, April 22, 1851.

ECHEGARAY, JOSÉ, a Spanish dramatist, mathematician and statesman; born in Madrid, Spain, in 1835. His studies finished, he took the position of professor of mathematics and physics in the Special School of Engineering at Madrid. He attained distinction in this line, and published several works of merit; among them, *Problems of Analytical Geometry* (1865) and *Modern Theories of Physics* (1867). He became Minister of Commerce in 1868, of Public Instruction in 1873, and of Finances in 1874. But his principal reputation is as a dramatist. Among his dramas are *The Highest Mark* (1875); *An Insane Devotion* (1879); and *Joyous Life and Sad Death* (1885).

ECHENEIDIDÆ, a family of fishes characterized by a sucking disk on the upper surface of the head, by which they attach themselves to other fishes. The *Remora* is a well-known representative of the family. See PILOT-FISH, Vol. XIX, pp. 96, 97.

ECHIMYD (*Echimys*), a genus of South American rodent quadrupeds, having the tail scaly, and the fur coarse and mingled with flattened spines. They are known as "spiny rats."

ECHINIDEA. See ECHINODERMATA, Vol. VII, pp. 629–632.

ECHINOCACTUS, a genus of cactus plants, comprising more than two hundred species, most of which belong to Mexico and the United States. They are globose or oval, mostly strongly ribbed, with clusters of spines (often very stout) on the ribs, and usually very showy flowers borne near the apex. See CACTUS, Vol. IV, p. 625; and HORTICULTURE, Vol. XII, p. 265.

ECHINUS. See ARCHITECTURE, Vol. II, p. 464.

ECHIUM, a genus of boraginaceous plants, of which there are about fifty species, represented by the common blueweed or viper's bugloss (*E. vulgare*, a native of Europe), but having become a weed in the United States.

ECHIURIDÆ, a family of greatly degenerated annelid worms. The larva is normal, but the adult is modified, so that the exact affinities are uncertain. They are all marine. Some species are found on coasts of the United States. See ANNELIDA, Vol. II, p. 70.

ECHO. See ACOUSTICS, Vol. I, p. 107.

ECHO CAÑON, a remarkable ravine, in the midst of magnificent scenery, in Summit County, northwestern central Utah, 975 miles from Omaha.

ECKERT, THOMAS THOMPSON, an American telegrapher; born in St. Clairsville, Ohio, April 23, 1825. He was connected with various telegraph lines until the beginning of the civil war, when he took charge of the military telegraph office at the headquarters of General McClellan. In September, 1862, he established the military telegraph headquarters in the War Department building at Washington. In 1864 he was brevetted brigadier-general, and then appointed assistant Secretary of War, retaining the office until 1866, when he resigned. Afterward becoming connected with various telegraph companies, in 1881 became vice-president and general manager of the Western Union Telegraph Company, and in March, 1893, president of that institution.

ECKFORD, HENRY, a naval architect; born in Irvine, Scotland, March 12, 1775. During the War of 1812 he was employed by the United States government to construct vessels of war for the lakes and inland waters. Later he built the steamer *Robert Fulton*, which eventually was purchased by the Brazilians. In 1820 Mr. Eckford became United States naval constructor at the Brooklyn navy-yard. Under his direction the government built six ships of the line. In 1831 he had built a sloop-of-war for the Turkish navy, and was preparing to enter the service of that government as chief naval constructor when he died, in Constantinople, Turkey, Nov. 12, 1832.

ECKMÜHL, a village of Bavaria, 13 miles S.E. of Ratisbon. Here, in 1809, Napoleon defeated Archduke Charles. See AUSTRIA, Vol. III, p. 133.

ECLAMPSIA. See PATHOLOGY, Vol. XVIII, p. 391.

ECLECTIC SCHOOL OF MEDICINE. See AMERICAN ECLECTIC SCHOOL OF MEDICINE, in these Supplements.

ECLIPSE. See ASTRONOMY, Vol. II, pp. 802–804.

ECLIPTIC. See ASTRONOMY, Vol. II, p. 771.

ECLOGUE. See PASTORAL, Vol. XVIII, p. 345.

*ECOLOGY, sometimes written ŒCOLOGY, a department of plant physiology so recently organized that it can be outlined only in an imperfect way. It is that phase of physiology which deals with plants in their external relations, as distinct from physiology proper, which deals with the internal economy of the plant. The main facts of ecology are not new, but their organization into a separate department of botany is comparatively recent. The subject deals with plants as living organisms in their broadest relationships, and has been styled the "biology of plants," but the word *biology* has too broad an application to be so restricted. In the following outline an attempt is made to present the main subjects of ecology, rather than a well-organized syllabus.

A. MODIFICATIONS OF FORM AND FUNCTION.

1. *The plant as modified by its environment.*

a. *By food.*

(1) Holophytes: the word signifies "the whole plant," and refers to those plants whose mode of life is entirely of the ordinary kind, which includes almost all green

* Copyright, 1897, by The Werner Company.

plants, which construct their substance from absorbed carbon dioxide, water, soluble nitrogen salts, and other salts; that is, from wholly inorganic materials. The province of ecology is to consider the various adaptations of the plant as a whole to obtain such food-material.

(2) Parasites: the adaptations of plants to secure their food-material from other living beings, including the general effect of parasitism upon plant-structure.

(3) Saprophytes: the adaptations of those plants whose nutrition is like that of ordinary animals, in that they are entirely dependent upon organized food, material obtained from dead organisms or from the products of living ones.

(4) Carnivorous plants: the adaptations of those plants which supplement the ordinary inorganic food of green plants by various contrivances to secure and absorb animal food. In this category fall *Dionæa*, *Drosera*, *Sarracenia*, *Nepenthes*, etc., with their elaborate traps of various kinds, as well as those plants which secure the same result by the simpler device of glandular secretions.

b. *By medium.*

(1) Those plants suspended in the atmosphere, as bacteria and other minute forms.

(2) Those plants supported in the atmosphere, as numerous species of epiphytic Orchids, Bromelias, etc.

(3) Those plants suspended in liquid, as numerous algæ, yeast, etc.

(4) Those plants surrounded by earth, as the truffles.

(5) Those plants partly in one medium and partly in another, as ordinary terrestrial plants in earth and atmosphere, ordinary aquatics in earth and water, and some in earth, water and atmosphere.

c. *By moisture.*

(1) Xerophytes: those plants which are adapted to dry localities, finding their extreme expression in the highly modified forms of deserts, as the *Cactaceæ* and numerous others. Often spoken of as "xerophilous plants."

(2) Hygrophytes: those plants which are adapted for wet places, sometimes called "hygrophilous" or "hydrophilous plants."

d. *By heat.*

(1) Megatherms: those plants adapted to a high temperature average, as palms.

(2) Mesotherms: those plants adapted to a moderate temperature average, as the orange.

(3) Microtherms: those plants adapted to a low temperature average, as oaks.

(4) Hekistotherms: those plants adapted to an arctic temperature, as the arctic lichens.

In addition to the four "heat groups" here indicated, there are a number of other groups not so readily defined.

2. *The organs as modified by environment.*

This phase of ecology has been very little studied, but represents a fertile field for investigation.

3. *Dependence of the plant upon other organisms.*

a. *Symbiosis:* certain plants have entered into relations of mutual helpfulness, in many cases having become so completely adapted as to be absolutely dependent upon one another. A prominent example is the group known as "lichens," which are various groups of fungi and algæ living in intimate symbiotic relations. The resulting combination makes it possible for these organisms to live in conditions which would be impossible for either alone.

b. *Mycorhiza:* really a special phase of symbiosis, referring to the connection found to exist between certain fungi and the roots of plants, notably trees (especially amentaceous trees), orchids, *Leguminosæ*, etc. The absorbent region of the roots is covered by a dense mycelial growth of the fungus, which is thought to promote the absorption of organic matter of the soil by its decomposition.

c. *Root-tubercles:* upon the roots of certain plants, notably the *Leguminosæ* (clover, peas, beans, etc.), gall-like growths are found, known as tubercles. These tubercles are formed through the irritation of a parasitic fungus, which has entered the root by way of the root-hairs. The relation between the fungus and green plant, however, seems to be one of symbiosis, since it is connected with the assimilation, by the latter, of free nitrogen. As a rule, plants cannot assimilate free nitrogen, but plants with root-tubercles can grow in a soil containing no trace of nitrogen compounds. The process is not understood, but the evident source of nitrogen is the free nitrogen of the atmosphere obtained by way of the soil, and combined in usable form by the fungus of the tubercle or some bacterial form of the soil. The association of the tubercle with this form of nitrogen assimilation has been demonstrated, but its immediate relation to the process is still a subject of inquiry.

d. *Mites and ants:* these insects are often utilized by plants for protective purposes, which are then called *myrmecophilous* ("ant-loving") plants. Sugar secretions secure the presence of certain ants, which keep off injurious ants and other destructive insects. In *Acacia sphærocephala*, regular "food-bodies" for the ant police are provided at the tips of the leaflets; in other species, various forms of ant shelter and colonization are provided.

4. *Specific adjustments.*

a. Protection against cold.
b. Protection against animals.
c. Collecting or shedding rain.
d. Devices for climbing.
e. Distribution of seeds.

5. *Natural life period.*

Under this category fall those factors and structures which determine the duration of plants, as in the case of annuals, biennials and perennials.

6. *Vitality of the plant and of its parts.*

The power of endurance of plants, as a whole, and of their different organs in particular, varies widely, and gives rise to a large series of adaptations.

7. *Germination and sprouting.*

a. Resting period.
b. Maturity of seeds and spores.
c. Conditions for germination.
d. Characteristics of seedlings.
e. Unfolding of buds.
f. Characteristics of young shoots.

B. Reproduction.

1. *Distribution and adjustment of the organs.*

a. *Monœcism:* a condition in which the two sets of sexual organs are separated from each other, but occur on the same plant.

b. *Diœcism:* a condition in which the two sets of sexual organs occur on different plants, and individual plants thus become male and female.

c. *Hermaphroditism:* a term used in special connection with "flowers," and indicating that stamens and pistils occur in the same flower, although morphologically these structures are not sexual. The various adaptations of the hermaphrodite flower for reproductive purposes fall under the following grouping:

(1) Dichogamy: in which the stamens and carpels of the same flower come to maturity at different times. If the stamens mature first, it is a case of *protandry;* if the carpels mature first, it is *protogymy.*

(2) Heterogamy: in which stamens and carpels mature together, but other adaptations have appeared to prevent close-pollination; as *dimorphism*, in which two forms of flowers occur; and *trimorphism*, in which there are three forms.

2. *Pollination by wind.*

Plants in which the agent of pollen-transfer is the wind, in which the adaptive structures are an abundance of powdery and even winged pollen, and absence of color, odor and nectar. Known as "anemophilous" plants, such as pines, oaks, grasses, etc.

3. *Pollination by insects.*

Plants in which there occurs the greatest variety of adaptive structures in relation to insect-visits, such as form, color, odor, nectar, character of pollen, etc. "Entomophilous" plant.

4. *Pollination by birds, snails, etc.*

The humming-birds especially are notable agents of pollen-transfer in certain plants, known as "ornithophilous" plants, while snails and other crawling forms serve the same purpose in certain clustered flowers.

5. *Protection of pollen from enemies and rain.*

The nectar-secretions provided for the attraction of desirable insects is equally attractive to other insects, notably ants, whose visits would prove useless, or even destructive. Devices to ward off these "unbidden guests" are almost as numerous as those to secure the presence of favorable visitors. Protection is necessary, also, against grazing animals, and against the injurious effects of rain upon both pollen and nectar.

6. *Effects of cross and close fertilization.*

A subject elaborately worked out by Charles Darwin, and further enriched by a vast body of additional observations.

7. *Apogamy.*

The production of the sporophyte from the gametophyte without the formation of a sexual spore. In case the development is from an unfertilized oösphere, it receives the name of *parthenogenesis*. The conditions of apogamy, and of reproduction in general without the use of a spore, are subjects of great ecological interest.

C. Development of the Plant Kingdom.

1. *Spontaneous generation.*
2. *Theory of descent.*
   a. Variation.
   b. Natural selection.
   c. Heredity.

This division of the subject presents that phase of biology which is undoubtedly of the deepest import.

D. Geographical Distribution.

1. *Means of distribution.*
2. *Influence of climate.*
3. *Influence of soil and of man.*
4. *Zones limited by elevation.*
5. *Zones limited by latitude.*
6. *Tension lines.*

To the botanist it will be apparent that the above outline is not sufficiently inclusive, but it will serve to present the range of subjects included under the head of Ecology.

John M. Coulter.

ECONOMY, a socialist village of Beaver County, western Pennsylvania, on the right bank of the Ohio River, and on the Pittsburg, Fort Wayne and Chicago railroad, about 17 miles from Pittsburg. The settlement was planted in 1825 by immigrants from Germany. The inhabitants own everything in common—3,500 acres of land, upward of 100 houses, with a church, a school, a museum and manufactories of wool, cotton and silk. Population, 413.

ÉCORCHÉ, an anatomical figure in which the muscles are represented, stripped of the skin, for purposes of artistic study. From a portion of the figure, the upper muscles also are removed, so as to exhibit those which lie nearer to the bone. These models are made usually of plaster, and sometimes of papier-maché.

ÉCOUTES, in military operations connected with siege-works, are listening-places. They are small galleries, excavated at regular distances, and going out beneath and beyond the glacis, toward the lines and batteries of the besiegers. Their purpose is to enable the garrison to hear and estimate the works being carried on by the sappers and miners of the enemy.

ECRASEUR, a surgical instrument invented in the early part of the nineteenth century by the French physician, Chassaignac. It was formerly much in use, but modern surgery has grown away from it. This instrument consists of a stem or hollow tube with a fine chain passing through it. The use to which it is applied now is the removing of pedunculated growths, such as piles or polypi. The chain or wire, in some cases, is passed around the object to be removed and tightened by means of an endless screw or lever. The object is literally torn away from the surrounding surface. A galvanic battery sometimes is attached and the wire heated to a white heat, thus cauterizing the tissues as fast as they are broken. Little bleeding follows the operation of the ecraseur, the torn vessels spontaneously contracting and closing. This instrument formerly was used, in cases of cancer, for the removal of the tongue.

ECTROPIUM, an everted condition of an eyelid, produced either by a tumefaction of the inner membrane, or by a contraction of the skin covering the eyelids, in consequence of which it does not cover the globe of the eye. It is capable of being remedied by a slight surgical operation.

ECUADOR (República del Ecuador). According to the official statistics of 1893, the area of the republic is 118,627 square miles, divided into 16 provinces and one territory, with a population of 1,270,000—100,000 whites, 300,000 mixed, and 870,000 Indians, besides an unknown number of uncivilized Indians. The capital, Quito, has a population of 80,000. Other chief cities are Guayaquil, with a population of 51,000; Cuenca, 30,000; Riobamba, 18,000; and Latacunga, 15,000. The religion of the republic, according to the constitution, is Roman Catholic, to the exclusion of every other. Primary education is gratuitous and obligatory. There is a university at Quito, and university bodies in Cuenca and Guayaquil. There are 35 secondary schools and 1,088 primary schools, with about 70,000 pupils. There are also a military school, commercial schools, and technical schools.

The revenue for 1898 was estimated at $9,093,551, and the expenditure $11,005,141. The public debt in 1898 was about $12,825,461; the payment of interest has been suspended since March, 1896. Seventy per cent of the revenue is derived from customs duties on imports at the port of Guayaquil. Although the National Convention of 1884 determined that the standing army should consist of but 1,600 men, the official statement for 1892 places the number actually in service at 3,341. The national guard consists of 95,329 men.

In 1897 the imports amounted to $18,004,048, and the exports to $31,025,382. In 1893 the chief articles of export were cocoa, valued at $6,487,000; India-rubber, $195,885; hides, $104,000; coffee, $815,000; vegetable ivory, $531,000. There are no trustworthy statistics of imports. The foreign commerce is chiefly with France, Great Britain, Germany, and the United States. Since 1890 explorations and surveys have shown that Ecuador is rich in gold along the Santiago river and in the province of Esmeraldas. No mining has as yet been the result of these discoveries.

The roads of the country are mostly bridle-roads, although a few cart-roads have been established in the interior. Since 1884 much activity has been manifested in railroad-building, but, owing to the difficulties encountered, only 58 miles had been built in 1898. The length of telegraphs is about 1,242 miles, with about 60 telegraph stations. For its history, topography, climate, productions, political and social condition, and earlier statistics, see ECUADOR, Vol. VII, pp. 644–49.

ECZEMA. See SKIN DISEASES, Vol. XXII, pp. 122, 123.

EDBROOK, WILLOUGHBY J., an American architect; born in Deerfield, Illinois, Sept. 3, 1843. In 1860 he became an apprentice to his father, a contractor and builder, and devoted himself to the study of architecture. The following year he went into business for himself, and soon became prominent as an architect. He was city commissioner of buildings of Chicago, Illinois, and on April 13, 1891, became supervising architect of the United States Treasury. Among the buildings designed by him are the Tabor Grand Opera House, in Denver, Colorado, and Notre Dame University, at South Bend, Indiana. He died in Chicago, March 25, 1896.

EDDY, CLARENCE, an American organist and composer; born in Greenfield, Massachusetts, June 23, 1851. He studied under Dudley Buck at Hartford, Connecticut, and in Germany under August Haupt and others. He attracted the attention of the masters in Europe, and upon his return to the United States in 1875 was elected organist of the First Congregational Church in Chicago. In 1879 he became organist for the First Presbyterian Church in that city. In addition, he has been, since 1877, director of the Hershey School of Musical Art of Chicago. He gave concerts at the Centennial Exposition of 1876 and the Paris International Exhibition of 1889. He is the author of a number of preludes and other classic forms. He has published a collection, *The Church and Concert Organist* (1882), and a translation of Haupt's *Theory of Counterpoint and Fugue* (1876). In 1896 he was accorded the unusual distinction of honorary membership in the St. Cecilia Academy in Rome.

EDDY, HENRY TURNER, an American mathematician; born in Stoughton, Massachusetts, June 9, 1844. After his graduation at Yale in 1867, he pursued scientific studies in the Sheffield Scientific School, and in 1868 became instructor of mathematics in the University of East Tennessee. He was assistant professor of mathematics at Cornell in 1869, associate professor of mathematics at Princeton, and in 1874 professor of mathematics at the University of Cincinnati. He was elected president of Rose Polytechnic Institute at Terre Haute, Indiana, in 1891. He has published *Analytical Geometry* (1874); *Thermodynamics* (1879); *Researches in Graphic Statics* (1878); and numerous contributions to periodicals.

EDDY, THOMAS, an American philanthropist; born in Philadelphia, Pennsylvania, Sept. 5, 1758. In 1779 he settled in New York and became a merchant, but failed in 1784. In 1790 he entered the insurance business, and soon made a large fortune. He was active in the establishment of a penitentiary system, and was director of the first building for four years. He became a governor of the New York Hospital in 1793, and in 1815 was one of the founders of the Bloomingdale Insane Asylum. He labored for the construction of the Erie canal, and was one of the originators of the New York Savings Bank, and also of the New York Bible Society. He wrote a work on the *State Prison of New York*. He died in New York City, Sept. 16, 1827.

EDDYSTONE LIGHTHOUSE. See LIGHTHOUSE, Vol. XIV, pp. 615, 616.

EDELWEISS, the popular name of *Leontopodium alpinum*, a species of *Compositæ* resembling the American Gnaphaliums, or "everlastings." It is a white, woolly herb, a native of the Alps, and cultivated in gardens. It has become a very popular plant with tourists among the Alps.

EDEN, two rivers. See CARLISLE, Vol. V, p. 108; and CUMBERLAND, Vol. VI, pp. 697, 698.

EDENTON, a town and one of the capitals of Chowan County, eastern North Carolina, on the Norfolk and Western railroad, and a port of entry on Edenton Bay, which opens into Albemarle Sound. It has important shad and herring fisheries. Population, 2,205.

EDGAR, a city of Clay County, southwestern Nebraska, 74 miles W.S.W. of Lincoln, on the Burlington and Missouri River and St. Joseph and Grand Island railroads. It has railroad repair-shops, a large canning establishment, pickling factory, a creamery, broom factory, spring-mattress factory, and also a large trade in the farm produce and stock of the surrounding country. Population 1890, 1,105.

EDGAR, KING. See ENGLAND, Vol. VIII, p. 286.

EDGAR THE ATHELING. See SCOTLAND, Vol. XXI, p. 481.

EDGAR THOMAS FURNACE. See IRON AND STEEL, in these Supplements.

EDGARTOWN, a port of entry and county seat of Dukes County, Massachusetts. It is on Martha's Vineyard, and has a small, safe harbor. It is engaged in the whale-fishery and the coast trade. It is becoming very popular as a summer resort. Population 1895, 1,125.

EDGECUMBE. 1. A bay in the coast of Australia, lying within the province of Queensland, near lat. 20° S. and long. 148° E. It is sheltered on every side but the north, its eastern barrier terminating in Cape Gloucester. 2. A mountain in Alaska, marking the northwest point at the mouth of Norfolk Sound, which connects the metropolitan settlement of New Archangel, on the island of Sitka, with the open ocean. It rises from the water's edge an almost perfect cone, which, during nearly the whole year, is capped with snow.

EDGEFIELD, a town of Edgefield County, central western South Carolina, 25 miles N. of Augusta, Georgia, on the South Carolina railroad. It is in a cotton district. It has manufactories of cottonseed-oil and fertilizers, and a tannery and brickyards. Population 1890, 1,168.

EDGEHILL, an elevation near the village of Keinton, Warwickshire, England, where the first great battle of the Civil War was fought, on Sunday,

Oct. 23, 1642, between the Royalist forces under Charles and the Parliamentarians under the Earl of Essex. The Roundheads were victorious, and after the battle 4,000 men lay slain at the foot of Edgehill, most of whom were Royalists.

EDGERTON, a city of Rock County, southeastern Wisconsin, on the Rock River, and on the Chicago, Milwaukee and St. Paul railroad, 25 miles S.E. of Madison. From this point is shipped nearly half the tobacco raised in the state. Population 1895, 1,972.

EDGEWATER, a village of Richmond County, southern New York, five miles N.E. of Richmond. It is chiefly a residence town for New York business men. Population 1890, 14,265.

EDHEM PASHA, a Turkish statesman; born in 1823. He was a native of Greece, but was sold into slavery when a boy. He was educated by his master in the School of Mines at Paris. Upon his return to Turkey in 1839, he was appointed a captain in the army. He was aide-de-camp to the Sultan in 1849, and made a general of division. He was appointed Minister of Foreign Affairs in 1867; President of the Council of State; and, in the diplomatic service, ambassador to Berlin and other courts. He was Grand Vizier in 1877, and has been ambassador to Paris since 1885.

EDICT OF NANTES. See FRANCE, Vol. IX, p. 579.

EDIRA, the capital of Knox County, northeastern Missouri, on the Fabius River, and on the Quincy, Omaha and Kansas City railroad, 45 miles W.N.W. of Quincy. It has a Catholic academy, and also a broom factory, a carriage factory, and a creamery. Population 1890, 1,456.

EDINBURG, a village of Erie County, northwestern Pennsylvania, on the French Creek and on the New York, Lake Erie and Western railroad. It has a state normal school. Population 1890, 1,107.

EDINBURGH, a village of Johnson County, southeastern central Indiana, on Blue River, and on the Pittsburgh, Cincinnati, Chicago and St. Louis railroad. It has good water-power, hominy-mills and a starch factory. Population 1890, 2,031.

EDINBURGH, a small village of Grundy County, central northern Missouri. It contains Grand River College.

EDINBURGH, ALFRED ALEXANDER WILLIAM ERNEST ALBERT, DUKE OF, and Prince of Saxe Coburg and Gotha, second son of Victoria, Queen of England; born at Windsor Castle, Aug. 6, 1844. He entered the royal navy in 1858 as a cadet, and was in service afloat in the Mediterranean, West Indies and America. December, 1862, he was offered the throne of Greece, but declined. In 1866 he was created first Duke of Edinburgh, Earl of Kent and Earl of Ulster. He was appointed to the command of a frigate in 1867, and proceeded to Australia, where, at Clontarf, New South Wales, he was wounded by an Irishman, O'Farrell, who was subsequently tried and executed. He continued his voyage, visiting China and Japan. In 1882 he was promoted to the rank of vice-admiral, and given command of the Mediterranean squadron. Aug. 22, 1893, by the death of his uncle, the Prince of Saxe-Coburg and Gotha and Duke of Saxony, he succeeded to the duchy and took the oath of loyalty to the German Empire. He was given the rank of general of infantry in the German army. He married, in 1874, Marie Alexandrova, only daughter of Alexander II of Russia. See GREECE, Vol. XI, p. 126, for the circumstances of his election to the throne of that kingdom and the reasons for his declination.

EDINBURGH REVIEW. See PERIODICALS, Vol. XVIII, p. 536.

EDINBURGH, UNIVERSITY OF. See EDINBURGH, Vol. VII, pp. 664, 665; and UNIVERSITIES, Vol. XXIII, pp. 846, 854, 855.

EDISON, THOMAS ALVA, an American inventor; born in Milan, Ohio, Feb. 11, 1847. His education was limited though it was supplemented by instruction from his mother and by his own reading. He became particularly interested in the study of chemistry. At the age of 12 he became a newsboy on the Grand Trunk railroad, and later printed the *Grand Trunk Herald* in the baggage-car of the train on which he sold his wares, disposing of it with his other papers. Becoming interested in telegraphy, he studied it late at nights in a railway station, and soon became an expert operator. He was employed as an operator in several Canadian offices, and at Adrian, Michigan. At this last place he fitted a small shop for repairing telegraph instruments and the making of new machinery. He then went to Indianapolis, where he invented his automatic repeater. After brief stops at other places, he went to Cincinnati with the acquired reputation of a successful inventor. From there he was called to Boston, where he perfected his duplex telegraph. Not long afterward Edison was made superintendent of the New York Gold Indicator Company, and transferred his shops to Newark, New Jersey. In 1876 he resigned this last engagement, in order to devote his entire time to research and invention, and located himself permanently at Menlo Park, New Jersey. Mr. Edison's inventions are many, and some of extraordinary value; among them are the phonograph, improvement in the electric light and the telephone, the microphone, the electric pen, the quadruplex and sextuplex transmitter, and the kinetoscope.

THOMAS A. EDISON.

EDISTO, a river and island of South Carolina. The river flows through the southwest part of the state, being formed near Branchville in Barnwell County, by the confluence of the North Edisto and the South Edisto, and entering the Atlantic by two arms, respectively named from the two confluents. Edisto also designates the island which separates those two arms. The stream is navigable for over one hundred miles, and its mouth is about twenty miles to the southwest of Charleston.

EDMONDS, FRANCIS W., an American artist; born in Hudson, New York, Nov. 22, 1806. He

was a bank cashier in Hudson and New York until 1855, studying in the mean time at the National Academy of Design. He was elected an associate in 1838, then a trustee, and in 1840 he became an academician. He studied in Europe, and later was instrumental in the establishment of the New York Gallery of Fine Arts. Among his productions are *Barnyard; Sewing-Girl; The City and Country Beaux; The Penny Paper; Vesuvius and Florence;* and *The Sleepy Student.* He died in Bronxville, New York, Feb. 7, 1863.

EDMONDS, JOHN WORTH, an American jurist; born in Hudson, New York, March 13, 1799. He began the practice of law in Hudson, New York, in 1820, and later became state recorder. In 1831 he was a member of the state assembly, and in 1832–36 of the state senate. In 1836–38 he was on a special mission among the Indians for the government, and on his return resumed the practice of law. In 1843 he became one of the state prison inspectors, and subsequently was instrumental in many important reforms in prison discipline. He was made a circuit court judge in 1845, a judge of the state supreme court in 1847, and judge of the court of appeals in 1852. He was converted to the doctrines of spiritualism in 1851, and later published books on this subject as well as on law. He died in New York City, April 5, 1874.

EDMONSTONE ISLAND, an outpost, as it were, of the delta of the Ganges, toward the Bay of Bengal, situated at the mouth of the Hoogly, the most westerly arm of the great river above mentioned, in lat. 21° 32′ N., and long. 88° 20′ E.

EDMONTON, a town of Alberta, western Canada, on the Saskatchewan River, a terminus of the Canadian Pacific railroad, about lat. 53° 30′ E., long. 113° 25′ W. It is of interest because daily reports are sent hence to the Weather Bureau at Washington, and severe winter storms often make their first appearance here. Population 1891, 3,875.

EDMONTON, a large village in the northeast of Middlesex, southeast England, near the Ken, seven miles N.N.E. of London. Population of parish 1871, 13,859. It contains many villas of London merchants, etc. Charles Lamb is buried in the churchyard here. Edmonton is connected with Cowper's humorous poem of *John Gilpin.*

GEORGE F. EDMUNDS.

EDMORE, a railroad junction and shipping-point in Montcalm County, east-central southern Michigan, 33 miles N. of Ionia. Population 1896, nearly 1,000.

EDMUNDS, GEORGE FRANKLIN, an American statesman; born in Richmond, Vermont, Feb. 1, 1828. He received a public school education and the instruction of a private tutor; studied and practiced law; was a member of the Vermont legislature in 1854, 1855, 1857, 1858 and 1859, serving three years as speaker; a member of the state senate, and its presiding officer *pro tem.* in 1861–62, was active in the Andrew Johnson impeachment, favored the reconstruction laws, and appointed to the United States Senate as a Republican to fill the vacancy caused by the death of Solomon Foot, and took his seat April 5, 1866; elected by the legislature for the remainder of the term ending March 4, 1869, and was re-elected successively four times. He was a member of the Electoral Commission of 1877. He was president *pro tem.* of the Senate after Arthur was elevated to the Presidency, and was the author of the act for the suppression of polygamy in Utah, known by his name. He retired from the Senate in November, 1891, owing to impaired health.

EDOM, Country. See IDUMEA, Vol. XII, p. 699.

EDRED OR EADRED, KING. See ENGLAND, Vol. VIII, pp. 284, 286.

EDRIOPHTHALMIA. See CRUSTACEA, Vol. VI, pp. 661 et seq.

*EDUCATION IN THE UNITED STATES, HIGHER. The subject may be treated under three heads,—I. The period of college-planting, 1636–1776; II. The period of expansion, 1776–1865; III. The period of university development, 1865–96. In part, this division is artificial. The multiplication of colleges has continued until the present time, while the beginnings of university development must be sought before 1865. Still, as college expansion is not the characteristic feature of the third period, or university development of the second one, the division answers to the general facts of the case, and will serve a useful purpose.

I. THE PERIOD OF COLLEGE-PLANTING, 1636–1776. The history of higher education in the United States begins with the following order or enactment, made by the general court of Massachusetts, Sept. 8, 1636:

"The court agreed to give £400 toward a school or college, whereof £200 should be paid next year, and £200 when the work is finished, and the next court to appoint where, and what building."

At subsequent meetings of the court it was ordered that the school should be located at Newtown, the name of which was afterward changed to Cambridge, and that it should be called Harvard College. The name of the town was changed, as President Quincy has explained, as "a grateful tribute to the Transatlantic literary parent of many of the first emigrants, and indicative of the high destiny to which they intended the institution should aspire." It was called Harvard because the Rev. John Harvard, a dissenting clergyman of England, resident of Charlestown, who died in 1638, bequeathed one half of his whole property, and his entire library, to the college. The act creating a board of overseers was passed in 1642, but teaching began in 1638. This was an humble beginning, but it was made within ten years of the "great emigration" to the shores of Massachusetts Bay. An attempt was made to concentrate upon the college the support of all the New England colonies, thus making it not merely a Massachusetts, but a New England institution; but the plan did not, in the end, succeed.

Eight other colleges were founded, in seven differ-

*Copyright, 1897, by The Werner Company.

ent colonies, before the Revolutionary War: William and Mary, Virginia, 1693; Yale, Connecticut, 1701; Nassau Hall, now Princeton, New Jersey, 1746; Kings, now Columbia, New York, 1754; Philadelphia, now the University of Pennsylvania, 1755; Rhode Island, now Brown University, 1764; Queens, now Rutgers, New Jersey, 1770; Dartmouth, New Hampshire, 1769. Some of these colleges grew out of older schools, and some had their rise at places other than those with which they have now long been identified. "Some future poet, or mythologist," President Gilman observes, "may personify these as the nine colonial muses." These colleges all had a common character. This was not so much because the eight later ones copied Harvard, as because they all copied a common original. The founders were Englishmen by birth or descent, and had little knowledge of institutions of higher learning except those of England. The founders of Harvard, many of whom were bred at Oxford and Cambridge, called their institution a college and a university indifferently, which shows that their minds had been deeply impressed by both sides of those great seats of learning. Wisely, however, they modeled it after the English college, and not after the English university. Moreover, all other American colleges and universities for 200 years conformed in general to the same model.

With a single exception, these colleges were virtually church schools. The Congregationalists controlled Harvard, Yale and Dartmouth; the Episcopalians, William and Mary and Kings; the Presbyterians, Princeton; the Dutch Reformed, Queens; the Baptists, Rhode Island. Philadelphia alone was nonsectarian, but even that partook largely of the ecclesiastical character of the times. *Christo et Ecclesiæ* might have been the motto of any one of them, as well as of Harvard, with the possible exception of Philadelphia. Church influence is seen in the make-up of the faculties, in the destination of the students, in the studies and discipline, and in the spirit of the schools. The presidents, and probably a majority of the professors and tutors, were clergymen; while one half of the 531 graduates sent out by Harvard previous to the year 1707 became clergymen. In her first period, so much Latin as was sufficient to understand Tully, or any like classical author, and to make and speak true Latin in prose and verse, and so much Greek as was included in declining perfectly the paradigms of the Greek nouns and verbs, were required for admission to Harvard. The first year the studies were logic, physics, etymology, syntax, and practice on the principles of grammar; the second year, ethics, politics, prosody, and dialect practice of poesy and Chaldee; the third year, arithmetic, geometry, astronomy, exercises in style, composition, epitome, both in prose and verse, Hebrew and Syriac. Besides these studies, all the students were practiced throughout the course in the Bible and the catechetical divinity. History was taught in the winter and botany in the summer; rhetoric was taught by lectures every year, and declamations were required of the students once a month. Still more, the students were practiced twice a day in reading the Scriptures and giving an account of their proficiency and experience in practical and spiritual truths, accompanied by theoretical observations on the language or logic of the sacred writers. They were careful to attend to God's ordinances and be examined on their profiting, commonplacing sermons and reporting them publicly in the hall. "Such," says President Quincy, "were the principles of education established in the college under the authority of Dunster. Nor does it appear that they were materially changed during the whole of the seventeenth century." All things were done according to the academical custom in England. The government was rectorial, the instruction tutorial. The scholars were not permitted to use the vernacular language within the college limits on any pretext. The freshmen were servitors, or fags, to the whole college, out of study hours, to go on errands. Still, we must not lay too much stress on the ecclesiastical side of the early American colleges. In those days church and state were but different sides of the same society, and the conception of secular or neutral education had not yet dawned upon men's minds; certainly not in the American Colonies or in England. This explains why governments, as that of Massachusetts, contributed freely from the public treasury to establish and support what we can hardly regard otherwise than as denominational institutions. Furthermore, these colleges looked to furnishing able servants for the state, as well as learned and godly ministers for the church, and how well they performed both offices is shown by the ability of the public men whom they trained, particularly at the time of the Revolution, and by the strength of the American pulpit.

We have an official account of the course of study at Harvard in 1726, as follows:

"1. While the students are freshmen they commonly recite the grammars, and with them a recitation in Tully, Virgil and the Greek Testament, on Mondays, Tuesdays, Wednesdays and Thursdays, in the morning and forenoon; on Friday morning, Dugard's or Farnaby's Rhetoric, and on Saturday morning the Greek Catechism; and, towards the latter end of the year, they dispute on Ramus's Definitions, Mondays and Tuesdays, in the forenoon.

"2. The sophomores recite Burgersdicius's Logic, and a manuscript called New Logic, in the mornings and forenoons, and, towards the latter end of the year, Heereboord's Meletemate, and dispute, Mondays and Tuesdays, in the forenoon, continuing, also, to recite the classic authors, with logic and natural philosophy; on Saturday morning they recite Wollebius's divinity.

"3. The junior sophisters recite Heereboord's Meletemata, Mr. Morton's Physics, More's Ethics, Geography, Metaphysics, in the morning and forenoons; Wollebius on Saturday morning, and dispute, Mondays and Tuesdays, in the forenoons.

"4. The senior sophisters, besides arithmetic, recite Allsted's Geometry, Gassendus's Astronomy, in the morning; go over the arts towards the latter end of the year, Ames's Medulla on Saturdays, and dispute once a week." *

* *Wadsworth's Diary*, p. 27, in *History of Harvard University*, by Josiah Quincy, vol. 1, p. 441.

"This extraordinary training in the ancient languages," says Professor Tyler, "led to forms of proficiency that have no parallel now in American colleges." He relates, further, that in 1649 some of the students at Harvard could with ease dextrously translate Hebrew and Chaldee into Greek. There was at the same institution, in 1678, an Indian student who wrote Latin and Greek poetry, and those arts continued a common accomplishment down to the Revolution, while the facile use of Latin for both conversation and oratory by Harvard and Yale scholars excited no remark. In the early history of several colleges much is heard of Christianizing the Indians. Dartmouth grew directly out of an attempt to accomplish that end; studies were prescribed for Indian students, that, in later opinion, reflected severely upon the good sense of those who prescribed them; but the results of the efforts, wherever made, were miserably disappointing. Still, the name of one Indian stands among the Harvard alumni.

So much space has been given to Harvard College because, in dealing with that institution, we are dealing with the highest type of American education. At some other colleges, the theological features and influence may have been less prominent, and even at Cambridge they yielded somewhat, as time wore on. It must be remembered that, in England contemporary liberal education was quite as theological as in America. Besides natural philosophy, no great stress was attached to modern studies. The demand for surveyors, particularly in Virginia, tended to emphasize mathematics. French was taught for a few months at Cambridge in 1735, and again for a brief period at the close of the Revolution, when the alliance with France tended to bring French arts and science, as well as Frenchmen, into the country. French is also found at William and Mary at the same time. Franklin made a gallant struggle for an English school in the institution at Philadelphia, but he was in advance of his time, and so failed, much to his mortification. German studies thrived at Philadelphia for a time, and then declined. No permanent provision for teaching modern languages and literatures was made at Cambridge until George Ticknor entered on the duties of the Smith chair in 1819, and no instruction was given there in German until the day of Charles Follen, the German exile, who taught his first class in 1825.

The foregoing is an outline view of higher education in the Colonies previous to the Revolution. What was done should not be estimated too lightly. Mr. Jefferson demanded of his correspondent, Mr. Bannister, in 1785, on his return from France, "Why send an American youth to Europe for education?" And then, after enumerating the objects of a useful American education, declared, "It is true that the habit of speaking the modern languages cannot be so well acquired in America; but every other article can be as well acquired at William and Mary College as at any place in Europe." Mr. Jefferson, it is to be observed, had made a particular study of contemporary education, not only on the Continent, but in England and Scotland. The remark just quoted was no doubt intended to apply mainly or only to undergraduate study. Mr. Jefferson admitted the inferiority of American education in medicine, but insisted that law could be studied as well in Virginia as in England. A recent historian of the Thirteen Colonies, H. C. Lodge, says, Harvard College, "at the period of the Revolution, probably afforded, in theology, philosophy and the classics, as good an education as could be obtained in Europe, for the professors were men of character and learning, and some of them eminent."

Previous to the Revolution it was very common for wealthy families in the Colonies to send their children, both sons and daughters, to Europe to be educated. This was especially the case in Maryland, Virginia and South Carolina. It is also to be observed, as marking the connection between the mother-country and the Colonies in that period, that considerable sums, and sometimes large sums, of money were obtained in England for American colleges, just as has since been done in the old states of the East for the new ones of the West.

II. The Period of Expansion, 1776–1865. The Revolution stimulated the planting of colleges much more than it stimulated the extension of public schools. From the close of the war to the close of the century, new colleges were founded more rapidly than one a year; namely, St. Johns, Washington, and Frederick in Maryland; Dickinson, in Pennsylvania; Union, in New York; Hampden-Sydney and Lexington, now Washington and Lee, in Virginia; Georgetown, in the District of Columbia; the University of North Carolina and the University of Vermont; Bowdoin College, in Maine; Williams, in Massachusetts, and Middlebury, in Vermont. Nor was this all: higher education was at once carried beyond the Appalachian ranges and planted in the great valley of the West. When Tennessee was still a part of North Carolina, the legislature of that state passed an act incorporating the president and trustees of Davidson Academy, which, in time, became the University of Nashville. At one time this institution exerted a widespread influence in the Southwest; then it declined, and is now reviving again. Transylvania University, Lexington, Kentucky, chartered in 1798, was the first institution of higher learning in the West to open its doors to students. After a period of prosperity it, too, declined, and years ago ceased to exist.

It will be seen that state universities have already appeared among the colleges. It is a probable conjecture that they were prompted, in part at least, by the Congressional land grants for universities in Ohio, which, it was understood, would be repeated in the case of other public land states. In all, there were about thirty college foundations in the country in 1801, as compared with nine in 1776. Moreover, from that day to this the number has continued steadily to increase. The statistics, unfortunately, are in a confused state, partly owing to inattention to collecting them, partly to carelessness, and partly to the difficulties of the subject itself. The Census-Office first collected educational statistics in 1840. The following table sums up the results then obtained, by states, so far as colleges and universities are concerned:

STATISTICS OF COLLEGES AND UNIVERSITIES IN THE UNITED STATES IN 1840.

STATE.	No. of Institutions.	No. of Students
Alabama	2	152
Arkansas	--	----
Connecticut	4	832
District of Columbia	2	224
Delaware	1	23
Florida	--	----
Georgia	11	622
Iowa	--	----
Indiana	4	322
Illinois	5	311
Kentucky	10	1,419
Louisiana	12	989
Maryland	12	813
Massachusetts	4	769
Maine	4	266
Michigan	5	158
Mississippi	7	454
Missouri	6	495
New Hampshire	2	433
New York	12	1,285
New Jersey	3	443
North Carolina	2	158
Ohio	18	1,717
Pennsylvania	20	2,034
Rhode Island	2	324
South Carolina	1	168
Tennessee	8	492
Virginia	13	1,097
Vermont	3	233
Wisconsin	--	----
Totals	173	16,233

In 1850 the Census-Office reported 234 colleges and universities; in 1860 it reported 467; and in 1870, as many as 579. Since 1870 no college statistics are found in the census reports. More discriminating inquiry has been made by the Commissioner of Education, who reported 337 colleges in 1869–70, and 451 in 1892–93. These numbers, however, do not include many so-called colleges contained in other tables. It is next to an impossibility to ascertain how many degree-conferring institutions there are in the country, and quite impossible to ascertain how many institutions there are bearing the name of "college" or "university." It is clear that a college-planting movement set in at the close of the Revolution, which has been sustained until the present time, and that this movement was marked by a distinct lowering of the old college ideal. For many years the former distinction between a college and a university was practically forgotten, and to a large extent it is overlooked to-day. The principal causes that have led to the constant multiplication of colleges appear to be these: 1. The territorial growth of the country; 2. The increase and wider dispersion of population; 3. The Congressional land grants to the states for universities and colleges of agriculture and mechanic arts; 4. Religious zeal and sectarian rivalry; 5. Local interests, sometimes embracing commercial interest; 6. The ambition of individuals to give their names as founders to institutions of learning; 7. Desire to commemorate the names of relatives; 8. The lowering of the college ideal. Attention should also be drawn to the impulse which the formation of the republic gave to the national life, and the augmentation of this impulse by the growth and prosperity of the country.

In general, the old type of study, instruction and discipline remained unchanged throughout this period. Greek, Latin and mathematics continued to be the principal studies. Studies were organized in prescribed courses, and the degree of A.B. was given to all graduates. A majority of the old institutions continued to hold their former leadership, but two or three fell behind new institutions. The differences in what passed for higher education were quite as marked as the differences of culture in the several regions or districts in which they were found. In this respect the statistics of 1840, showing the relative numbers of college students in different states, are very significant. One of the most important facts was the founding of the state universities, most of which grew out of the Congressional land grants. (See Schools, Public, in the United States, in these Supplements.) The establishment of these institutions involved ultimately, if not at once, the assumption, by the states, of a definite position in the field of higher education, which carried with it state supervision and support, and so a distinct secular influence. Upon the whole, church influence considerably declined; still, the higher institutions, including the state universities, remained mainly in the hands of clergymen. When Josiah Quincy, a layman, was made president of Harvard in 1829, it was thought a clear invasion of clerical privilege.

How far the multiplication of colleges has been an evil is a question of judgment. It is common to hear scholars, especially those at the great seats of learning, lament this multiplication, with the consequent dispersion of funds, teaching-power and students. "How much better," they say, "it would have been if the funds, professors and students had been brought together at a few great institutions, as in Germany, France and England." These forget that, to a great extent, such a concentration never could have been effected, and that the policy of dispersion has tended very considerably to augment all the factors. No doubt there has been much waste; no doubt, owing to the increase of wealth, the elevation of the standard of living, and especially the greatly improved means of transportation, the time has come for more concentration, such, in fact, as we are now seeing: but there is a great deal of truth contained in the notable words of Mr. Bryce:

"The European observer conceives that his American friends may not duly realize the services which these small colleges perform in the rural districts of the country. They get hold of a multitude of poor men who might never resort to a distant place of education. They set learning in a visible form, plain, indeed, and humble, but dignified even in her humility, before the eyes of a rustic people, in whom the love for knowledge, naturally strong, might never break from the bud into the flower but for the care of some zealous gardener. They give the chance of rising in some intellectual walk of life to many a strong and earnest nature, who might otherwise have remained an artisan or storekeeper, and perhaps failed in those avocations. They light up, in many a country town, what is at first only a farthing rushlight, but which, when the town swells to a city, or when endowments flow in, or when some able teacher is placed in charge, becomes a lamp of glowing flame, which may finally throw its rays

over the whole state in which it stands. In some of these Western colleges one finds to-day men of great ability and great attainments; one finds students who are receiving an education quite as thorough, though not always as wide, as the best Eastern universities can give. I do not at all deny that the time for more concentration has come, and that restrictions on the powers of granting degrees would be useful. But one who recalls the history of the West during the last fifty years, and bears in mind the tremendous rush of ability and energy towards a purely material development which has marked its people, will feel that this uncontrolled freedom of teaching, this multiplication of small institutions, have done for the country a work which a few state-regulated universities might have failed to do. The higher learning is in no danger. The greatest universities of the East, as well as one or two in the West, are already beginning to rival the ancient universities of Europe. They will soon have far greater funds at their command with which to move towards the same ideal that Germany sets before herself; and they have already what is better than funds — an ardor and industry among teachers which equals that displayed fifty years ago in Germany by the foremost men of the generation, which raised the German schools to their glorious pre-eminence."

III. The Period of University Development, 1865–96. Reforms in higher education in the United States were pioneered by three distinguished men: Thomas Jefferson, George Ticknor and Francis Wayland.

Thomas Jefferson, who early interested himself in the subject of education, caused some reforms to be made in William and Mary College about the close of the Revolution. When in Europe, as minister of the United States to France, he studied the subject in its general bearings, and returned home filled with new ideas and new enthusiasm. After his retirement from the Presidency, he matured a plan of state education for Virginia, that, in 1817, he thus outlined in a letter to George Ticknor:

"I am now entirely absorbed in endeavors to effect the establishment of a general system of education in my native state on the triple basis,—1. Of elementary schools which shall give to the children of every citizen, gratis, competent instruction in reading, writing, common arithmetic and general geography; 2. Collegiate institutions for ancient and modern languages, for higher instruction in arithmetic, geography and history, placing, for these purposes, a college within a day's ride of every inhabitant of the state, and adding a provision for the full education, at the public expense, of select subjects from among the children of the poor, who shall have exhibited at the elementary schools the most prominent indications of aptness, of judgment and correct disposition; 3. A university in which all the branches of science deemed useful at this day shall be taught in their highest degree. This would probably require 11 or 12 professors, for most of whom we shall be obliged to apply to Europe, and most likely to Edinburgh, because of the greater advantage the students will receive from communications made in their native language."

While this grand programme failed, Jefferson still lived to become the founder of the University of Virginia, which opened its doors to students in 1825. The fundamental idea of this institution was the organization of separate schools, each with its own instructors, in which a degree was conferred, calling the recipient a "graduate" of this school, and without reference to other schools, and sometimes, but not always, carrying with it a title, as doctor of medicine, bachelor of law, etc. Accordingly, the University has been described as "a collection of schools, each devoted to a special subject, but under a common government." The plan involved the abolition of a prescribed curriculum and of the class system, and the recognition of specialization and election of studies, as far as the resources of the University permitted. At the South, the University of Virginia has exerted a powerful influence; but at the North its influence has been little felt. Originally there were seven schools in the University; the number has now greatly increased.

In 1819 George Ticknor entered upon the duties of the chairs of the French and Spanish languages and belles-lettres at Harvard College. He had spent the preceding four years in European study and travel, and returned home thoroughly familiar with the German universities. He soon began to agitate reforms at Harvard, and, mainly owing to his influence, some changes were resolved upon in 1825. Ticknor contended that the colleges of the United States had long been considered merely places for obtaining a degree of bachelor of arts; that recitations were mere examinations, while study and teaching were extremely superficial; that the class system prevented those who wished to investigate from doing so, since the class must be kept together and be hurried from teacher to teacher and from subject to subject. He wrote: "We have now learnt that as many years are passed in our schools and colleges and professional preparation as are passed in the same way and for the same purpose in the best schools in Europe, while it is perfectly apparent that nothing like the same results are obtained; so that we have only to choose whether the reproach shall rest on the talents of our young men, or on the instruction and discipline of our institutions for teaching them." For himself, he did not hesitate to place it on the schools, by no means omitting the colleges. The changes ordained in 1825 are thus described: "The division of the whole institution into departments, with the right of a limited choice of studies; the separation of the members of the class for their exercises according to their proficiency, so that each division might be carried forward as rapidly as was consistent with thoroughness, every man having a right to make progress according to his industry and capacity; and the opening of the college to those who wished to pursue special studies without taking a degree." But the professors, only one of whom besides Mr. Ticknor, Edward Everett, had studied in Europe, were committed to the old hard-and-fast college scheme, and so in a few years the reform, save alone as it affected Mr. Ticknor's work, was for the time abandoned. When Ticknor resigned his professorship in 1835, he assigned as one reason, that he had abandoned all hope of further change in the college. The present president of Harvard University has called Ticknor a "reformer fifty years in advance of his time." The radical changes which have been effected at Harvard within the last quarter of a century justify his forecast.

The third reformer is President Wayland of Brown University, who published his *Thoughts on the Present Collegiate System in the United States* in 1842. He recommended changes in the character of governing boards and in the mode of appointing instructors. He contended that professors should be appointed

by competition; that their tenures and salaries should depend upon their labors and success, and that means should be provided for their removal from their chairs if they proved incompetent or unfaithful. But his most radical ideas related to the course of instruction. He held that,—1. The standard of admission to college should be raised; 2. The instruction in the college should be made more thorough, even at the cost of limiting the number of studies, or of the extension of the period of residence to five or six years; 3. That the college should be developed into a university. He suggested the addition of the degree of bachelor of science, or of literature to the old A.B. degree. Dr. Wayland desired more freedom and scope for both students and teachers; he did not believe in time-limits, but in fixing the standard of scholarship, and then taking time enough to work up to it. In 1850 Dr. Wayland made his celebrated *Report to the Corporation of Brown University on Changes in the System of Collegiate Education*, in which he developed his ideas more in detail. The key-note of the report was freedom. "The various courses should be so arranged that, in so far as it is practicable, every student might study what he chose, all that he chose, and nothing but what he chose. The faculty, however, at the request of a parent or guardian, should have authority to assign to any student such courses as they might deem for his advantage." An immediate effort to carry out some of these ideas at Brown University was made; but the force of this effort did not survive Dr. Wayland's retirement from the presidency in 1855.

Just what were the relations between these three educational reformers, it is hard to say. It is well known, however, that Jefferson and Ticknor were personal friends, and corresponded, and it is to be presumed that each one learned something from the other. Dr. Wayland also visited the University of Virginia.

From the year 1825 onward there was, as can now be clearly seen, looking backward, a slow progressive movement in higher education, taking the country as a whole. The University of Virginia never fell back from the advance ground that it first assumed. The poet-professor Longfellow, who had studied abroad, succeeded to Ticknor's chair at Harvard College, and continued the work on the same lines. Moreover, with an occasional backset, as during the administration of Dr. Sparks, Harvard, as a whole, moved slowly in the right direction until the inauguration of President Eliot in 1869. Dr. Eliot was an apostle of the new education, and immediately entered on that policy of change which has so thoroughly renovated Harvard University. In his report for 1883–84 he announced the extension of the elective system to the freshman year, which he styled "the practical completion" of a development which began sixty years before. This extension left as the sole prescribed studies in the college, one year of rhetoric, English composition, German or French, and one year of physics or chemistry. Save alone the English composition, these requirements have since been abolished. These innovations have been strongly resisted both inside and outside of the college, but they have apparently become permanent in themselves, and have certainly exerted a great influence upon the country.

In the mean time a new movement was preparing in the West. From the return of Everett and Ticknor to Harvard, laden with the spoil of German learning, American students, in slowly increasing numbers, went to the German universities to study, and returned home more or less Germanized in both scholarship and educational ideals. Previous to 1850, about fifty such students studied at Göttingen, and as many more at Berlin. Many of these men became professors in American colleges and universities. At the same time, German ideas were reaching the public mind, through the medium of reports, pamphlets, lectures, and the like. The American educational renaissance, to which many causes contributed, began about 1835. In 1831 M. Victor Cousin made his celebrated *Report on the State of Public Instruction in Prussia* to the French Minister of Education, and four years later a translation of this report was published in New York. A copy of this document, either in the original or in English, made its way to the forests of Michigan, and, falling into right hands, shaped the foundations of the educational system of that young state. The constitution of 1835 recognized the so-called "Prussian ideas"; viz., three grades of public instruction, created, maintained and supervised by the state. The University of Michigan dates from 1837—the year that the state came into the Union. At first, so great is the force of tradition, the University was organized and conducted on the old-fashioned college lines; but with the coming of Dr. Henry P. Tappan as president in 1852, there entered into it a new potency, which in course of time changed it into a thoroughly modern institution of learning, the influence of which has been widely and strongly felt. The University of Michigan has been the type to which all the really vigorous and subsequent state universities have conformed more or less closely. Reference has once been made to the state universities as introducing a secular factor into the higher education. This fact, together with the possession of comparatively large resources, has given these institutions an influence in many of the Western states that has been very powerful, if not controlling.

The Civil War gave education of all kinds a tremendous impetus. The states became more liberal and enterprising than before, private individuals more public-spirited. For the last thirty years it has been no uncommon thing for a single year to register an addition to the private educational benefactions of the country of ten million dollars. Several new and prominent institutions owe their origin wholly to private initiative, or to joint private and public initiative. Mention may be made of Cornell University, which opened its doors in 1868; Johns Hopkins, 1867; Vanderbilt, 1875; Leland Stanford, Junior, 1891; and Chicago University, 1892. All these institutions, and many more beside them, have been organized on modern lines, some of them *very* modern. Meanwhile, many old institutions have extended and strengthened their work, as Dartmouth College, Yale College, now Yale University, Columbia College, now Columbia University, the Univer-

sity of Pennsylvania, and Princeton College, which has recently become a university. The endowments and incomes devoted to higher education have grown wonderfully. In 1842 President Wayland spoke of the great amount of money enlisted in higher education in New England, asserting that it amounted to $1,500,000,—a sum, be it remarked, that at present would not pay the annual expenses of the two foremost New England institutions of learning.

The general development need not be followed further; but it is important to set down the distinctive features of current higher education in the United States: 1. Freedom; elective studies; 2. The wide expansion of curricula; 3. The growth of faculties; 4. Laboratory methods of instruction; 5. The use of the lecture method; 6. The employment of the seminary, which stands for research on the one side, as the laboratory does on the other; 7. Graduate study, leading to the higher degrees; 8. The differentiation of degrees, as A.B., Ph.B., B.S., and B.L.; 9. Freedom in respect to discipline, the old proctorial method having been very generally abandoned; 10. The growing conviction that a university, at least, is primarily a place for study and teaching, and not for the formation of moral or religious character; 11. The decline of the sectarian spirit, involving often the decay of ecclesiastical ideas and influence (although these ideals and influence are still strong in many denominational schools).

Two or three topics should receive something more than mention. One is the growing participation of women in the higher education. Although it is little more than fifty years since the contention for such education began, the battle is already fully won. Women are admitted to the advantages of the higher training and culture in three ways: Colleges for women, as Wellesley, Smith, and Vassar; co-educational institutions, as Oberlin College (which was the first college to open its doors to women); and the state universities and "annexes," or colleges for women, affiliated with old institutions, as Ann Radcliffe College at Cambridge, and Barnard College at New York. In 1892–93 as many as 310 co-educational colleges reported to the Bureau of Education, with 27,317 male and 11,583 female students. The same year, 141 colleges for males only reported 20,130 students. The co-educational colleges included schools that threw open any or all departments to both men and women. The same year, 143 colleges for women reported 16 of higher and 127 of lower rank. The schools of the first class reported 4,023 students, the second class 18,926, or a total of 22,949.

A second topic is the multiplication of schools for teaching science and technical studies, and the elevation of their standard of work. Sometimes these schools are integral parts of larger institutions, as the Lawrence and Sheffield schools at Cambridge and New Haven; sometimes they are wholly independent, as the Massachusetts Institute of Technology. Different institutions have quite different ideals. The agricultural colleges are doing a good work for agriculture, but experience proves that they do not educate many farmers.

The last topic is professional education. Under the old *régime* the candidate for the ministry, after taking his A.B. degree at college (which was, as we have seen, a semi-theological institution), pursued his theological training in some minister's study; while lawyers and doctors obtained nearly all their professional training, the first in lawyers' offices, the second in doctors' offices. In these particulars, ideals and methods have almost wholly changed; the best work in the learned professions is now done in professional schools. There were professors of divinity in the old colleges, but the first theological school was established in connection with Rutgers College, in 1784. Andover dates from 1807, Princeton 1811, Harvard 1817, Union 1836. In 1892–93 there were 142 schools of theology in the country, with 7,836 students and 1,502 graduates. George Wythe is the first professor of law of whom we read (William and Mary College, 1779). The first law school was founded at Litchfield, Connecticut, in 1782. The Harvard school dates from 1817. In 1833 there were six law schools, with 150 students. In 1892–93 there were 63 such schools, with 6,776 students and 2,400 graduates. The first medical school in the United States was founded in Philadelphia, in connection with the university, in 1765. The Harvard school dates from 1783. In 1892–93 the Commissioner of Education published the names of 246 schools of medicine, dentistry, pharmacy, and for nurses and veterinarians, with 28,900 students and 7,232 graduates. Beyond the learned professions this account need not go.

Bibliography. *Report of the Commissioner of Education, 1892–93;* D. C. Gilman, *Education in America, 1776–1876* (*North American Review*, July, 1876); M. C. Tyler, *History of American Literature;* H. C. Lodge, *A Short History of the American Colonies;* R. H. Boone, *Education in the United States;* Josiah Quincy, *History of Harvard University;* F. A. Thorpe, *Benjamin Franklin and the University of Pennsylvania;* H. B. Adams, *Contributions to Educational History* (particularly No. 2, *Thomas Jefferson and the University of Virginia*); same, *William and Mary College;* Thomas Donaldson, *The Public Domain* (for legislation in regard to land grants to universities and agricultural colleges); G. W. Knight, *History and Management of Land Grants for Education in the Old Northwest* ("Papers of the American Historical Associaton," vol. 1); B. A. Hinsdale, *Documents Illustrative of Educational History in the United States, with Annotations* (in Report of Commissioner of Education, 1892–93); same, *Spirit and Ideals of the University of Michigan* (*Educational Review* for April and May, 1896); Andrew Tenbrook, *American State Universities and the University of Michigan;* C. W. Eliot, *Report of Harvard University for 1883–84;* George Ticknor, *Life, Letters and Journals;* Francis Wayland, *Thoughts on the Present College System of the United States;* same, *Report to the Corporation of Brown University, 1850;* J. O. Murray, *Francis Wayland; Four American Universities* (*Harvard, Yale, Princeton and Columbia*) (1891); James Bryce, *The American Commonwealth.*

See also SCHOOLS, in these Supplements.

B. A. HINSDALE.

EDWARDS, AMELIA BLANDFORD, an English writer of fiction, and Egyptologist, was born in London in 1831, and died at Weston-super-Mare, Somersetshire, April 15, 1892. She was the daughter of a peninsular officer, and cousin of M. B. Betham-Edwards, the novelist. Her taste for art and literature was evidenced from an early age, and in 1853 she

began to be known to the public as a contributor to the press. Though best known as a novelist and traveler, she wrote a number of educational works, chiefly abridgments of English and French history, besides a volume of ballads, and also contributed largely to the magazines. The following are Miss Edwards's principal novels: *My Brother's Wife* (1855); *Hand and Glove* (1859); *Barbara's History* (1864); *Half a Million of Money; Debenham's Vow* (1870); *In the Days of My Youth* (1873); *Lord Brackenbury* (1875); and *Miss Carew* (1865), a collection of short tales. The latter years of her life she devoted chiefly to travel, the first record of which, dealing with the Dolomite region, in the southern Tyrol, was published in 1873, under the title of *Untrodden Peaks and Unfrequented Valleys.* This was followed, in 1877, by *A Thousand Miles Up the Nile*, giving an account of the remarkable discoveries made at Abu-Simbel (forty miles below the second cataract), together with a ground plan of the temple which Miss Edwards's party excavated, and other interesting archæological matter illustrated by her pen and pencil. The later fruit of the author's interest in Egyptian exploration, a fund for which she founded in London in 1883, is a work entitled *Pharaohs, Fellahs and Explorers* (1891), besides a number of contributions on Egyptian archæology to the magazines and reviews. During the winter of 1889–90 she lectured on her favorite topic in the United States, and received from Columbia College, New York, the honorary degree of doctor of philosophy. In 1878 she compiled a volume of selections from the English poets and prose-writers for the Tauchnitz Library. Previous to her death she founded a chair of Egyptology at Oxford, and made an excellent translation of Professor Maspero's *Manual* (for students and travelers) *of Egyptian Archæology*, a guide to the study of antiquities in Egypt.

AMELIA B. EDWARDS.

EDWARDS, Bela Bates, an American clergyman; born in Southampton, Massachusetts, July 4, 1802. He was licensed to preach in 1830. From 1828 to 1833 he was assistant secretary of the American Education Society. He was made professor of Hebrew in Andover Theological Seminary in 1837, and in 1848 was elected associate professor of sacred literature. In 1828–42 he was editor of the *American Quarterly Register;* in 1833–35, of the *American Quarterly Observer;* in 1835–38, of the *American Biblical Repository;* and in 1844–52, of the *Bibliotheca Sacra.* He wrote several works on miscellaneous subjects, which include *Biography of Self-Taught Men* (1831) and *Memoirs of E. Cornelius* (1833). He died in Athens, Georgia, April 20, 1852.

EDWARDS, Henry Stillwell, an American journalist and writer; born in Macon, Georgia, April 23, 1855. Upon the completion of his elementary education, he studied law and was admitted to the bar of Georgia. He did not continue long in that profession, however, but soon turned to journalism. He joined the staff of the Macon *Daily Telegraph*, and within a few years became its editor. He soon attracted the attention of the reading public by his stories of Southern negro life, published in the *Century* and other periodicals. Among these stories were *Two Runaways; Ole Miss an' Sweetheart;* and *De Valley an' de Shadder.* In 1895 he was awarded the $10,000 prize, offered by the Chicago *Record* for the best "mystery story," for his story, *Sons and Fathers.* This story established his growing reputation, and caused critics to class him among the leading writers.

EDWARDS, Jonathan, an American theologian, second son of the famous Jonathan Edwards; born in Northampton, Massachusetts, May 26, 1745. He was graduated from Princeton College in 1765. He received a license to preach in 1766; was a tutor at Princeton College from 1767 to 1769, when he became pastor of the society in White Haven, Connecticut; was made pastor of the church at Colebrook in 1796, and in 1799 became president of Union College. He wrote many important works on theological subjects, and edited his father's writings. Among such edited works were his father's *History of the Work of Redemption.* His own published writings included *A Dissertation Concerning Liberty and Necessity* (1797), an explanation of his father's "theory of the will," and *Necessity of the Atonement and Its Consistency with Free Grace in Forgiveness* (1785). He died in Schenectady, New York, Aug. 1, 1801.

EDWARDS, John Ellis, an American Methodist Episcopal clergyman; born in Guilford, North Carolina, Aug. 1, 1814; was graduated from Randolph-Macon College and entered the Methodist Episcopal ministry in 1834. He was prominent among the leaders in the movement toward the secession of the Southern branch of his denomination. He published *Travels in Europe* (1857); *The Confederate Soldier* (1868); *The Log Meeting-House* (1884); and other works.

EDWARDS, Justin, an American clergyman; born in Westhampton, Massachusetts, April 25, 1787. He was graduated at Williams in 1810. He was ordained in 1812; became a member of the executive committee of the New England Tract Society, and in 1821 became corresponding secretary. He was prominent in the organization, in Boston, of the "American Society for the Promotion of Temperance," in 1825. He was for a while pastor of a new church in Boston, but resigned in 1830 to devote the next six years to the cause of temperance. From 1836 to 1842 he was president of the Andover Theological Seminary, when he became secretary of the American and Foreign Sabbath Union. The last few years of his life were spent in writing on religious topics. Of one of his temperance tracts, *Well-Conditioned Farm*, over 750,000 copies were printed before 1857. He died at Bath Alum, Virginia, July 23, 1853.

EDWARDS, Landon Brame, an American

physician, son of John Ellis Edwards; born in Prince Edward County, Virginia, Sept. 20, 1845. He served in the Confederate artillery, and, after the war, was graduated in medicine from the University of the City of New York. He acquired an extensive practice in his native state, and was one of the founders of the Medical Society of Virginia. He established the Virginia *Medical Monthly* in 1874, and since 1875 has been connected with the Virginia Medical College, first as lecturer on materia medica, and later on medico-jurisprudence. He has published papers on *Chloral Hydrate in Chronic Gastric Ulcer*, and *Strychnia in Tremulous Effects of Tobacco-Smoking*.

EDWARDS, Matilda Barbara. See Betham-Edwards, Matilda Barbara, in these Supplements.

EDWARDS, Ninian, an American lawyer and public man; born in Montgomery County, Maryland, in March, 1775. Admitted to the bar in Kentucky in 1798, and in Tennessee the following year; appointed judge of the general court of Kentucky, judge of the circuit court in 1803, of the court of appeals in 1806, and chief justice of the state two years later. From 1809 to 1818 he was governor of the territory of Illinois, and from 1818 till 1824 was a United States Senator from the state of Illinois; from 1826 to 1830 he was again governor of Illinois. He died in Belleville, Illinois, July 20, 1833.

EDWARDS, Ninian Wirt, an American lawyer and public man; son of the preceding; born in Frankfort, Kentucky, April 15, 1809; admitted to the bar of Illinois in 1833; appointed attorney-general of Illinois in 1834; a member of the legislature from 1836 to 1852. He served as superintendent of public instruction from 1854 to 1857. During the Civil War he acted as captain-commissary of subsistence. Early in his active life he married Elizabeth P. Todd, a sister of Mrs. Abraham Lincoln. This relationship drew him into an intimate friendship with Lincoln, and caused him to take part in many of the great agitations of the day. He published, in 1870, *The Life and Times of Ninian Edwards, and History of Illinois*, a work of permanent value.

EDWARDS, Oliver, an American soldier; born in Springfield, Massachusetts, Jan. 30, 1835. Entering the army at the beginning of the Civil War, as a lieutenant, he rose, gaining almost every step by acts of personal gallantry, to the rank of brigadier-general in 1865. His services were most conspicuous during the second day of the battle of the Wilderness; at Spottsylvania (1864), where he held the "bloody angle" for eleven hours with his own brigade, and at the head of twenty regiments faced the enemy for thirteen hours thereafter. He was with Sheridan in the Shenandoah valley, and received from the mayor of Richmond the surrender of the city, April 3, 1865; and at Sailor's Creek, April 5, 1865, he captured Generals Custis Lee and Ewell. General Edwards, after the war, returned to mercantile pursuits. The "Florence" oil-stove is of his invention.

EDWARDSVILLE, a city and the capital of Madison County, southwestern Illinois, on the Cahokia Creek, 19 miles N.E. of St. Louis, Missouri, on the Wabash, the Toledo, St. Louis and Kansas City, and the Chicago, Peoria and St. Louis railroads. It has two newspapers, manufactories of plumbers' supplies, bricks, carriages and wagons. A short distance out of the town is a factory of sanitary supplies, successfully operated on the co-operative plan. Population 1890, 3,561.

EEL, a river of northeastern Indiana, which rises in Noble County, flows west-southwest, and enters the Wabash at Logansport. Another river of the same name, length and direction rises in Boone County, central Indiana, and enters the Wabash four miles above Newport. Below this the Wabash becomes navigable.

EFFERVESCING POWDERS. See Tartaric Acid, Vol. XXIII, pp. 69, 70.

EFFINGHAM, a city and the capital of Effingham County, southeastern Illinois, 199 miles S.W. of Chicago, on Salt Creek, and on the Wabash, the Terre Haute and Indianapolis, and the Indiana and Illinois Southern railroads. It is engaged in the manufacture of brick principally, but has a large trade in farm produce and stock. Population 1890, 3,260.

EFT or EVET. See Triton, Vol. XXIII, p. 577, note.

EGAN, Maurice Francis, an American scholar and author; born in Philadelphia, Pennsylvania, May 24, 1852; graduated at La Salle College and Georgetown University, his education being specially designed for a literary career. For a while he studied law, but soon adopted journalism as a profession, editing *McGee's Illustrated Weekly* successfully. He afterward traveled through the Western and Southern states and Mexico, his observations being embodied in various magazine articles and letters to the press. He next became editor of the *Catholic Review*, and in 1881 of the *Freeman's Journal*. He furnished articles for Appleton's *Cyclopædia*, and was a frequent contributer to periodical literature. He is the author of several works, including *That Girl of Mine* (1877); *That Lover of Mine* (1877); *Preludes, Sonnets, Poems and Legends* (1880); *The Life Around Me* (1880); *A Collection of Stories* (1885); *A Garden of Roses* (1886); a collection of tales of a marked religious cast; and at various intervals, *Essays in English Literature; Modern Novels and Novelists; Primer of English Literature*, and *The Theater and Christian Parents*. His more recent publications include *A Gentleman*, a book on social ethics, with a chapter on *What to Read* (1893); *The Success of Patrick Esmond; The Vocation of Edward Conway*, the latter an interesting picture of American life; *Jack Chumleigh*, a romance; *A Marriage of Reason* (1893); *Flower of the Flock* (1894); *The Glories of the Catholic Church*, a contribution to encyclopædic literature; and *The Best Literature of the World*. He was for several years connected with Notre Dame University, Indiana, as professor of English literature, afterward occupying a position as instructor in the Catholic University of America, in Washington.

EGAN, Pierce, a British author, son of Pierce Egan (1772–1840), the author of many sporting

works, including *Boxiana* and *Life in London;* born in London in 1814. He received his education at the Royal Academy Art School, and was for a number of years an illustrator for the *Illustrated London News*. He wrote a great number of novels; among them, *The Flower of the Flock* (1865); *My Lady Maude* (1881); and *Waits: A Christmas Story* (1883). He died in London, July 6, 1880.

EGERIA, the name of the nymph or Camena, from whom, according to the legend, King Numa received the ritual of public worship which he established in Rome. The grove where Numa met the goddess to receive her instructions was dedicated by him to the Camenæ. See NUMA POMPILIUS, Vol. XVII, p. 613.

EGG OR EIGG, an island 12 miles off the west coast of Inverness-shire, in the Sea of the Hebrides, 8 miles S.W. of the south point of Skye. It is 4½ miles long, 2½ broad. It consists chiefly of trap, which in the north alternates with sandstone and limestone, the latter rocks containing Oölitic fossils, carbonized wood and coal. Lat. 56° 54′ N., long. 6° 9′ W.

EGGA, a large town of the Soudan, Africa, Yaruba country, situated on the right bank of the Niger, 280 miles above its mouth, in lat. 8° 43′ N., long. 6° 20′ E. Its streets are narrow, and the houses principally huts built of clay, the walls smooth and stained with indigo. Great quantities of narrow cotton cloth, generally dyed blue, are manufactured here. The population is partly Mohammedan and partly pagan. Population, 12,000. See SOUDAN, Vol. XXII, p. 279.

EGG–APPARATUS, in botany, a name applied to the group of (usually three) cells found in the micropylar end of the embryo-sac (*mącrospore*) of flowering plants, one of which is the *oösphere*, or female gamete, awaiting the approach of the pollen-tube with the male gamete; the other two are the *synergidæ*, naked cells, somewhat resembling the oösphere and probably to be regarded as modified oöspheres, but serving some purpose in the process of fertilization. The oösphere usually is placed more centrally and deeper in the embryo-sac than are the synergidæ. The fertilized oösphere gives rise to the embryo, and after fertilization the synergidæ more or less slowly disappear. See figure under EMBRYO-SAC, in these Supplements.

EGG–BIRD (*Sterna fuliginosa*), a bird of the gull family, sometimes called the "sooty tern." These birds are numerous on the coast of Florida and the West Indies. The eggs of this tern were formerly an important article of commerce. The name is applied, also, to many other sea-birds whose eggs are collected for use as food. See TERN, Vol. XXIII, p. 189.

EGG CROP, in the United States. See AGRICULTURE, in these Supplements.

EGGER, ÉMILE, a French classical scholar; born in Paris, July 18, 1813. His parents were of German origin. He was elected professor of Greek literature in the faculty of letters in the university in 1855. He was an officer of the Legion of Honor and a member of the Academy. He published editions of the various classics and *Elementary Comparative Grammar* (1854); *History of Philology* (1863); *Greek Literature* (1880); and other works. He died in Royat, Aug. 31, 1885.

EGGLESTON, EDWARD, an American author; born in Vevay, Indiana, Dec. 10, 1837. He became a Methodist preacher in 1856, and later held pastorates at St. Peter's, St. Paul, Stillwater and Winona. In 1866 he was associate editor of the *Little Corporal*, a children's paper, published in Evanston, Illinois; in 1867–70, editor of the Chicago *Sunday School Teacher;* in 1870–71, editor of the New York *Independent;* and in 1871–72, editor of *Hearth and Home*. From 1874 to 1879 he was pastor of the Church of Christian Endeavor, in Brooklyn. His novels depict early life in Indiana, and have been widely read. The first of them, *The Hoosier Schoolmaster*, was contributed to *Hearth and Home* as a serial story, and attracted attention from all sides. Among his other novels are *The Circuit Rider* (1874); *The Graysons* (1888); and *The Faith Doctor* (1891); and has also written a number of books for children, which include *The Hoosier School Boy* (1883); *First Book in American History* (1889); and *Duffels* (1893); and contributed constantly to the *Century Magazine* in the way of sketches, poems, etc.

EDWARD EGGLESTON.

EGGLESTON, GEORGE CARY, an American author, brother of the preceding; born in Vevay, Indiana, Nov. 26, 1839; studied at Indiana Asbury University and Richmond College, Virginia, and began the practice of law in Virginia. He served in the Confederate army throughout the Civil War, and at its close engaged in journalism in New York. He became editor-in-chief of the *Hearth and Home*, in 1875 literary editor of the *Evening Post*, editor of the *Commercial Advertiser*, and in 1889 editorial writer on the *World*. He has published *A Rebel's Recollections* (1874); *The Wreck of the Red Bird* (1882); and *Juggernaut* (1891).

EGG–PLANT. See HORTICULTURE, Vol. XII, p. 282.

EGG–SHELL CHINA. See CERAMIC ART, in these Supplements.

EGHAM, a village of Surrey, England, on the right bank of the Thames, 8 miles S.S.E. of Windsor and 21 W. of London. In the vicinity are Runnymede, Cooper's Hill and the Royal Holloway College for Women, opened by the Queen in 1886. Population of parish, 9,000.

EGILSSON, SVEINBJÖRN, an Icelandic antiquarian and lexicographer; born in southern Iceland, Feb. 24, 1791. He studied at the University of Copenhagen. In 1819 he became assistant in the Latin school at Bassastardir, and in 1846 was called to the rectorate at Reykjavik. He gained his reputation through his dictionary of the words used in the Old Norse poetry, his Latin translation of the sagas of the Norse kings, and his Icelandic translation of Homer. He died Aug. 17, 1852.

EGLESTON, THOMAS, mining engineer; born in New York city, Dec. 9, 1832; graduated from Yale in 1854, and from the Paris School of Mines in 1860. He was connected with the mineralogical department of the Smithsonian Institution in 1861–64; was one of the organizers of the Columbia College School of Mines in 1863; and in 1864 assumed the chair of mineralogy and metallurgy, retiring in 1897. He was employed on various government expeditions, and was made a chevalier of the French Legion of Honor. He published *Tables for the Determination of Minerals* (1867); *Lectures on Mineralogy* (1871); *Metallurgy of Gold and Silver* (1890), etc.

EGMONT, PORT, on the northern coast of West Falkland Island, between Saunders and Keppel islands. It has good anchorage and water for vessels, but can supply no provisions.

EGREMONT, a market town of Cumberland, England, on the river Eden, 6 miles S. E. of Whitehaven; has iron mines. On an eminence stand the ruins of Egremont Castle, the legend of whose horn forms the subject of a poem by Wordsworth. From 1749 till 1845 Egremont gave the title of earl to the Wyndham family. Pop. 1891, 6,243.

EGRET. See HERON, Vol. XI, p. 761.

EGYPT. For the geography, climate, productions, history, and early statistics, see EGYPT, Vol. VII, pp. 700–88. The historical record there given closed with 1877, at which time Ismail I was khedive. In June, 1879, he was deposed by his suzerain, the Sultan of Turkey, at the instance of the Western powers. Prince Tewfik, his eldest son, was proclaimed in his stead. Tewfik died Jan. 7, 1892, and was succeeded by his son, Abbas Hilmi. In 1880 the finances of Egypt, by an agreement of the European powers, were placed in the hands of a commission composed of representatives of Great Britain, France, and Egypt, one from each. This commission drafted a plan of liquidation of the Egyptian debt and of the revenue collection. Since 1883 a British official representative has been kept by the Khedive as his personal financial adviser, whose consent is necessary before any financial regulations can be passed. In 1883 the system of government was changed so as to provide for a legislative council of thirty members, a consultative body merely; and a general assembly, a partly representative body, without legislative powers, but with power to veto certain taxes. The council meets once a month, the assembly every two years. The Khedive has a cabinet, composed of six ministers: of the interior, finance, justice, war, public works and public instruction, and foreign affairs. The interior government consists of six governorships of larger cities, and fourteen provinces, or mudiriehs.

A standing army of about 18,000 men is maintained under the command of a British officer, who has the title of Sirdar. Great Britain has over 5,500 soldiers stationed in Egypt. In 1898 there were about 10,000 schools, with 17,000 teachers, and 228,000 pupils. The government maintains nine schools for higher education in the various professions. There are, in addition, 43 European private schools, 108 Protestant and Catholic mission schools, and various other private institutions. According to the census of 1897, the population was 9,734,405, as against 6,817,265 in 1882, an increase of over 45 per cent. In Jan., 1898, the debt was about $505,000,000. The revenue in 1897 was about $55,000,000, and the expenditure about $53,000,000. There were, in 1898, 1,166 miles of railways belonging to the state, and 72 miles privately owned; also 2,269 miles of telegraphs.

Egypt has had almost constant trouble since 1880. First, in 1881–82, the rebellion under Arabi Pasha caused the bombardment of the forts of Alexandria by the British. Then, in 1883, the Mahdi gathered the dervishes of the Sudan and began a bloody war, of which the culminating act was the murder of GENERAL CHARLES G. GORDON (q.v., *post*, pp. 1425–27), at Khartum. British interference stopped the rebel advance and held Wady Halfa as the advanced post of Egyptian territory. In March, 1896, the Khalifa threatened Egypt, and steps to crush him were taken by the British government. Trouble arose among the European powers over the question of the payment of the expenses of the war by Egypt; but Great Britain persisted in the military operations. Other opposition was developed against Great Britain by the French, who thought the expedition against the Khalifa was a movement in aid of the Italians in their struggle with the Negus, Menelek of Abyssinia, or that its real aim was to establish British control over the whole of the Egyptian Sudan, thus interfering with French plans of extension in that region.

The Egyptian sirdar, General Sir H. H. Kitchener, was made commander-in-chief of the expeditionary force, numbering 12,000 men, all native Egyptian troops except 1,200 British regulars. Before the end of March the black troops were on the march toward the southern frontier. By the middle of April the advance had reached Assouan. On the 15th a force of 1,500 natives, under Colonel Lloyd, left Suakim for the Horasab hills. Halting at Teroi wells, the native cavalry, sent out to reconnoiter, were attacked in the bush by 200 dervish horsemen. The Egyptians kept the dervishes at bay all night, repulsing four attacks.

Two sections of the aëronautic corps were dispatched from Aldershot, this being the first attempt to employ balloons in active service with British troops. Toward the end of May a brigade of Indian troops sailed from Bombay for Suakim.

On June 7, 1896, the Egyptian troops inflicted a severe defeat on the dervishes at Ferkeh, about 20 miles south of Akasheh; and on June 8 Suarda fell into the hands of the Egyptian force under Major Murdoch. These operations proved that the Egyptian troops, once among the poorest in the world, could be thoroughly relied upon, under British officers, in operations against the dervishes.

An easy advance was made on Dongola, Sept. 20, 1896. The route lay along the Nile, the gun-

boats covering the left flank, and the cavalry and the camel corps the right flank. The dervishes abandoned their outposts as the advance column came in sight; the cavalry pursued whatever bodies of dervishes came in sight, while the gunboats did great execution; and Dongola was occupied Sept. 22–23, 1896. In 1897 the Anglo-Egyptian troops captured Abu-Hamed after severe fighting (Aug. 7) and Berber (Sept. 7–13); and in 1898 they routed a Dervish army of 16,000 men on the Atbara (April 8), and totally defeated the Khalifa's army of 50,000 men at Omdurman, and occupied that city (Sept. 2), thereby virtually completing the reconquest of the Egyptian Sudan. See also KITCHENER, *post*, pp. 1797*a*–1797*b*.

EGYPTIAN ARCHITECTURE. See ARCHITECTURE, Vol. II, pp. 384, 392.

EGYPTIAN LANGUAGE AND LITERATURE. See Vol. VII, pp. 721, 722.

EGYPTOLOGY, the study of the archæology of Egypt, including the history from the beginning, and every relic or monument that will in any way throw light upon the early life of the people of that once powerful state. The exploration and study of Egypt has been active for about a hundred years. Nothing of importance was discovered until 1799, when Boussard, one of Bonaparte's artillery captains, discovered the now famous Rosetta stone. On this stone was a proclamation, written in Greek, demotic and hieroglyphics. The translation of the first two readings led to the ultimate deciphering of the third, and through it access was had to the numerous writings on the monuments of Egypt. This gave an impulse to the exploration which year by year has laid open the Egyptian beginnings. Many important discoveries have been made, and the museums of Europe and the United States have been enriched greatly. Since 1883 the exploration of the ancient temples and tombs has been conducted under the auspices of the Egypt Exploration Fund Society. This society is organized for the purpose of historical investigation in Egypt, conducted in a scientific manner, with the object of solving some of the important questions in regard to the history of the sojourn and exodus of the Israelites, and the early sources of Greek art. The antiquities found are divided between the National Museum of Egypt, the British Museum, the Boston Museum of Fine Arts, and others. Annual volumes are published, giving the results of each season's work, with maps and plates. An archæological survey of Egypt is being conducted by the society, which, when completed, will furnish a map, photograph, copy, and plan of all of the most important sites, sculptures, paintings and inscriptions in the valley of the Nile, between Cairo and Assuan.

EHNINGER, JOHN WHETTON, an American artist; born in New York City, July 22, 1827. After graduation from Columbia in 1847, he studied in Europe in 1848–49, and again in 1851–52. Besides drawing in outline, pencil and India ink, he has produced many popular paintings, principally illustrative of New England rural life. He illustrated an edition of *Miles Standish* (1858) and Hood's *Bridge of Sighs* (1849). Among his paintings are *Yankee Peddler; Love Me, Love My Horse;* and *Vintage in the Valtella* (1877). He died in Saratoga Springs, New York, Jan. 22, 1889.

EHRENBERG, CHRISTIAN GOTTFRIED, a German naturalist and traveler; born in Delitzsch, Saxony, April 19, 1795; died in Berlin, June 27, 1876. He was granted his degree in 1818 by the University of Leipsic. He made a special study of microscopy, and did his first scientific work in a study of the cryptogamous plants. From 1820 to 1826 he was in Syria, Egypt, and Arabia, doing scientific exploration. In 1829 he went with Humboldt to the Ural Mountains. He was appointed to a professorship in Berlin in 1826. He published *Scientific Travels Through Northern Africa and Western Asia* (1828); *The Infusoria as Perfect Organisms* (1838); *Micro-Geology* (1856); and other works. His discovery of the infusorial origin of the earth's crust entitled him to a high rank among his fellows. See FORAMINIFERA, Vol. IX, pp. 386, 387.

EHRENFELD, a busy town of western Prussia, 2 miles W. of Cologne by rail; manufuctures glass-wares, railway fittings, chemicals and bricks; it has also flour-mills and machine-shops. Population, 18,243.

EICHBERG, JULIUS, a German musical composer; born in Düsseldorf, June 13, 1824. After a time spent in study at Brussels under De Beriot and Fetis, and a short while at Geneva as professor of the violin, he moved to Boston, Massachusetts, in 1859, and founded the Boston Conservatory of Music in 1867. He attracted the attention of musical critics soon after his arrival in America by his compositions for the violin. He became known by reason of his operas, also. Among his operas are *The Doctor of Alcantara* (1862); *The Rose of Tyrol; A Night in Rome;* and *The Two Cadis.* He died in Boston, Jan. 19, 1893.

EICHLER, AUGUST WILHELM, a German botanist; born in Neukirchen, Hesse, April 22, 1839; received his degree from the University of Marburg. He was an instructor at Munich from 1865 to 1871, and professor of botany successively at Gratz, Kiel and Berlin. He edited *Flora Brasiliensis*, a botanical journal, for a number of years, and published a standard work on flower-structure in 1878. He was a specialist in structural and systematic botany, and as such was held in high esteem. He died in Berlin, March 2, 1887.

EICHWALD, CHARLES EDWARD, a Russian naturalist; born at Mitau, Russia, July 4, 1795. He studied at Berlin and Vienna. He was appointed professor of zoölogy at St. Petersburg in 1838. In 1840 he made a geological journey through Italy, Sicily and Algeria. His geognostic, botanical and zoölogical researches were unquestionably of more service to Russia than those of any other man since Pallas. Among his writings may be mentioned *Fauna Caspio-Caucasia* (1841); *The Primitive World in Russia* (1847); and *Palæontology of Russia* (1851). He died in St. Petersburg, Nov. 10, 1876.

EIDER, RIVER. See SCHLESWIG-HOLSTEIN, Vol. XXI, p. 414.

EIDOLOSCOPE, a machine, on the same general

principle as the kinetoscope, for exhibiting a series of instantaneous photographs in such a manner that they appear to the eye in the form of a continuous panorama. The main point of difference between the two is in the manner in which the film containing the pictures is moved across the field of view. In the kinetoscope a continuous band of film fifty feet long is employed, and this is looped over a series of pulleys. In the eidoloscope the film is one long strip, each end of which is attached to its spool, and as the pictures are being exhibited, the strip of film unwinds from one spool to the other. In the method first employed in the operation of this machine, there was an irregularity in the presentation of the pictures, due to the fact that the varying sizes of the two spools at different stages of the pictured scene, when one might be almost full and the other almost empty, resulted in different speeds for the film as it passed light and lens. The inventor of the eidoloscope then devised an automatic appliance for making this progress absolutely regular, and protected it from imitators. This feature is regarded as a point of superiority over other devices intended to accomplish a similar purpose. Among the pictures exhibited by this machine is one of a more comprehensive and ambitious character than has previously been attempted—that of the drill engaged in by Troop A of the National Guard of New York state, at Van Courtland Park, New York, May 23, 1896.

C. H. COCHRANE.

EIDOSCOPE, an apparatus devised by Woodville Latham, similar to the kineto-phonograph, and used to display, upon a screen, life-size pictures made from continuous photographs, so that the pictures displayed reproduce the motions of the persons who performed when the photographs were originally taken. It is used for exhibition purposes, and displays a white and black picture, of fair legibility, though slightly marred by the trembling of the apparatus, incident to the rapid stopping and starting of the strip bearing the pictures. It was exhibited in several of the larger cities of the United States in 1895 and 1896.

EIFEL PLATEAU, a barren and bleak plateau of Rhenish-Prussia, located between the rivers Rhine, Moselle and Roer, and showing extensive traces of volcanic activity. Its surface, which ranges at an average altitude of fifteen hundred to two thousand feet, is for the most part broadly undulating, and diversified by crater-like depressions and volcanic peaks and ridges, while toward its edges it is seamed by deep, wooded, rocky ravines. Its highest, and at the same time most inhospitable, parts are in the west and northwest, whence it falls away gradually to the Rhine on the east and to the Moselle on the south. The central portion of the plateau is crossed by a range of basaltic summits, the loftiest in the Eifel system, including the Hohe Acht (2,494 feet), Nurberg (2,255) and Kellberg (2,211). The ridges of the northwest are connected by the Hohe Venn with the Ardennes. Geologically, the basement of the plateau belongs to the Lower Graywacke of the Devonian formation, with eruptions of Eifel limestone, parts of which are rich in fossils. Above this are deposited, with tolerable regularity, in a horizontal position, strata of Triassic age, containing considerable quantities of metallic ores, especially zinc and lead. The Eifel was for a long period the scene of volcanic activity; zones and islands of basalt are frequent, as, also, eruptive masses of basaltic lavas, with tufa and pumice. With the exception of the vine and fruit trees on the east and south edges of the plateau, and a little agriculture (up to 1,700 feet), the Eifel is uncultivated, its rocky soil being too poor, and its climate too raw and bleak, for anything to grow, but heather. See GEOLOGY, Vol. X, pp. 341, 342; and PRUSSIA, Vol. XX, p. 20.

EIFFEL, GUSTAVE, a French engineer; born in Dijon, France, Dec. 15, 1832. He studied at the Paris Central School of Arts and Manufactures, and first attracted general attention by the construction of the Bordeaux bridge, in which was used, for the first time extensively, the compressed-air method of sinking foundation-cylinders. He afterward erected the Garabit viaduct, the grand vestibule and principal façade of the Paris Exposition of 1878, the framework for Bartholdi's Liberty Statue, and many other works of engineering skill. The one work, however, which has made him known throughout the civilized world is the Eiffel Tower of the Paris Exposition of 1889, the greatest engineering feat attempted in modern times. This tower was the result of experiments undertaken to prove the greatest limit to which metallic piers in viaducts could be safely pushed. The tower is 984 feet high; at the height of 896 feet it is 33 feet in diameter; total weight of iron used in construction, 7,300 tons. A system of elevators carries persons to the top; and the whole structure is capped by an immense lantern. In recognition of his genius in the erection of this tower, M. Eiffel was made an officer of the Legion of Honor. He tarnished his reputation somewhat by his connection with the Panama scandal of 1893. He was then convicted of misappropriating funds of the canal company, and was sentenced to fine and imprisonment.

GUSTAVE EIFFEL.

EIKON BASILIKE. See CHARLES I, Vol. V, p. 407.

EILETHYIA, a town of Egypt. See EGYPT, Vol. VII, pp. 736, 782.

EIMEO. See TAHITI, Vol. XXIII, p. 22.

EISENERZ, a small town of western Austria, in the north of the province of Styria, 20 miles W.N.W. of Bruck. It is worthy of mention only for its connection with the Erzberg (ore mountain), at the southern base of which the town lies. This mountain, which is about 2,840 feet high, and about five miles in circumference at the base, is literally a solid mass of iron ore, of a quality so rich, that, instead of cutting mines into it and following the metal in

veins—which process was formerly adopted here—the top and sides of the rock are quarried from the outside, and the ore is then broken small, and conveyed to the smelting-house without further preparation. Mines have been worked on this mountain for upward of one thousand years.

EISENLOHR, AUGUST, a German Egyptologist; born at Mannheim, Oct. 6, 1832. He studied theology at Heidelberg and Göttingen, and afterward devoted considerable attention to natural science, especially chemistry. About 1865 he became interested in the study of Egyptian hieroglyphics, and in 1869 became instructor in Egyptology at the University of Heidelberg. Being sent by the Grand Duke of Baden to Egypt, he ascended the Nile to the second cataract, and returned through Palestine, Syria and Asia Minor. In 1872 he was made professor in the University of Heidelberg. He has made valuable translations of papyri belonging to the British Museum; among them, *The Political Condition of Egypt Before the Reign of Rameses III* (1873) and *The Mathematics of Ancient Egypt* (1877).

EKATERINOGRAD OR YEKATERINOGRAD, a town and fortress in the south of Russia, in the government of Caucasus, situated on the left bank of the Terek, in lat. 40° 43′ N., and long. 44° 3′ E. It is an important military post of the Cossacks. A stone triumphal arch was erected at Ekaterinograd by Catherine II, in memory of Prince Potemkin, who founded the town in 1777.

ELÆAGNACEÆ, the oleaster family, of which there are about 35 species, all natives of north temperate countries. *Elæagnus angustifolia*, the oleaster, sometimes called "wild olive," is a small, spiny tree of the Mediterranean region, hoary with stellate hairs, and is frequently planted for its silvery white foliage and fragrant flowers. *E. argentea* is a native of the western United States, and is known as "silver-berry," while *Shepherdia Canadensis* and *S. argentea* ("buffalo-berry") are shrubs of the plains and mountains of western and northern United States. The whole family is characterized by silvery scurf, which covers the leaves and branches.

ELÆIS, a genus of tropical palms, with pinnate leaves, and closely allied to *Cocos*, the cocoanut palm. *Elæis guineensis* of western Africa yields the palm-oil extensively used in the manufacture of soap. The oil is obtained from the mesocarp of the plum-like fruits, and from the seeds.

ELÆOCARPUS, a genus of *Tiliaceæ*, mostly East Indian trees. The fruits of some are eaten, and the deeply wrinkled stones, often called "olive nuts," are made into beads for necklaces and bracelets in India.

ELÆOCOCCA, a genus of *Euphorbiaceæ*, the seeds of some of which yield useful oils. The oil obtained from *Elæococca verrucosa* is used for food in Japan, notwithstanding considerable acridity. The tree is cultivated in the Mauritius, and the oil is there used only for burning. That obtained from *Elæococca vernicia* of China is used in painting.

ELÆODENDRON, a genus of trees of the family *Celastraceæ*, having a five-parted calyx, five petals, a five-angled disk, five stamens, the ovary immersed in the disk, and a drupaceous fruit. *Elæodendron glaucum*, a native of Ceylon and southern India, is sometimes called the Ceylon tea-tree, because its leaves resemble those of the tea-shrub. The timber of *Elæodendron croceum*, called saffronwood in Cape Colony, is much used there in building and cabinet-making; it is fine-grained, hard, and tough. The fruit of *Elæodendron kubu*, another South African species, is edible. That of *Elæodendron argan* yields an oil similar to olive-oil, much used by the Moors.

ELAGABALUS. See HELIOGABALUS, Vol. XI.

ELANET (*Elanus*), a genus of birds of the family *Falconidæ* and subfamily kites, often known as the black-winged kites. Species are found in the warmer parts of both hemispheres. See KITE, Vol. XIV.

ELAPS. See SNAKES, Vol. XXII, pp. 196–97.

ELASMOBRANCHS, a name applied by many zoölogists to the group of vertebrates which includes the sharks and skates. The name refers to the plate-like gills, and is synonymous with Selachians and Chondropterygians, used by some authors.

ELASTIC CURVE. If an elastic beam, supported at each end, be subjected to a force that produces bending, the upper fibers of the material are in a state of compression, and the lower ones in a state of tension. There must then be a layer between, which is neither compressed nor extended; this is called the *neutral axis* or *surface*, and the curve representing it is called the *elastic curve*.

ELASTIC LIMIT. See ELASTICITY, Vol. VII, pp. 797–801; and STRENGTH OF MATERIALS, in these Supplements.

ELASTIC TISSUE, in anatomy, same as *Yellow Fibrous Tissue*. It has great elasticity.

ELATERIDÆ, a Linnæan genus of coleopterous insects, now divided into many genera, and forming the family *Elateridæ*. The head is in almost all cases inserted deeply into the thorax; a strong spine on the under part of the thorax, at its base, fits into a groove. They are generally found upon the flowers and leaves of plants, which are their food. See COLEOPTERA, Vol. VI, p. 132.

ELATH. See AKABAH, GULF OF, Vol. I, p. 434.

ELBASAN, town, Albania, Turkey; makes copper and iron wares; seat of a Greek bishop. Pop. 15,000.

ELBERTON, a town, capital of Elbert Co., Ga.; has a college and public library, and manufactures cotton goods, fertilizers, and cottonseed oil. Large granite quarries are found here. Pop. 1890, 1,572.

ELBURZ MOUNTAINS, in Persia, S. of the Caspian Sea; highest peak, Demavend, 19,400 feet.

EL CANEY, a picturesque old town in Santiago de Cuba province, Cuba, about three miles northeast of Santiago de Cuba, by whose wealthier citizens it is used as a suburban place of residence. Population of commune about 9,000. During the Spanish-American War it was, on July 1, 1898, after a desperate conflict, captured by the American troops under General Shafter, the three brigades engaged in the assault being commanded respectively by Brigadier-General Adna R. Chaffee, Colonel Miles, and General Ludlow. On July 2 the Spaniards attempted unsuccessfully to retake the town. During the two days the Americans lost several hundred in killed and wounded; but the Spaniards also lost heavily, including about 2,000 prisoners.

ELCESAITES OR ELKESAITES, a Jewish sect of the second century, founded by a Jew, Elxai, hence their name. The doctrines held by the sect were in part Christian and part Gnostic. They were called Ebionites by Epiphanius, and lived, in the time of that writer, in the Dead Sea district. To them Jesus was merely a prophet, whose teaching had been completed by a new revelation and a succeeding prophet. Hippolytus tells of a book possessed by this sect, which, to them, was sacred, and was supposed by them to have fallen from heaven. The same author ascribes their name to their calling themselves *El kesi* (hidden power).

ELCHO, FRANCIS WEMYSS CHARTERIS DOUGLAS. See WEMYSS, in these Supplements.

EL DAKKEL, DAKHEL OR DAKHELA. See OASES, Vol. XVII, p. 695.

ELDORA, a town and the capital of Hardin County, north-central Iowa, 60 miles N.N.W. of Des Moines, on the Iowa River, and on the Iowa Central railroad. The state reform school is located here. The town has flouring and planing mills, brick and tile works, and an electric-light plant. It is a shipping center for large quantities of coal, live-stock and grain. Population 1895, 2,096.

ELDORADO, city and county seat of Butler County, southeastern Kansas, situated on Walnut River, and on the Atchison, Topeka and Santa Fé and Missouri Pacific railroads. It has water-works, gas and electric lights, woolen and flour mills, machine-shop, iron foundry and extensive quarries. Population 1895, 3,518.

ELDORADO SPRINGS, a popular health-resort of Cedar County, southwestern Missouri. It is a rapidly growing town, its popularity being due to the presence of several springs, whose waters are chalybeate. Population 1895, nearly 2,000.

ELDRED, a railroad junction of McKean County, northwestern Pennsylvania, 24 miles E. of Bradford, on the Western New York and Pennsylvania, the Coudersport, and Port Allegheny railroads. It is in a coal-mining district. Population 1890, 1,050.

ELEA OR VELIA, a Greek town, founded by the Phocæans, about 543 B.C., in Lucania, between Pæstum and Buxentum. Possessed of a good harbor, it became a place of some importance in Cicero's time, and is known as the seat of the Eleatic school of philosophy. A famous temple of Ceres was located here.

ELECTION, in law, is the act of choosing between two or more legal rights or remedies. Thus when a party to a contract has the right to pay a sum of money, or deliver a definite amount of property, in fulfillment of his part of the contract, he may choose which alternative he will adopt. After his election has been made, he must abide by it. One thus having the right of election must make his choice in proper time, and must choose one of the alternatives in the entire, and will not be permitted to adopt a part of each. A widow who is a beneficiary under her deceased husband's will, if the will undertakes to dispose of or in any manner limit her dower interest in his estate, must elect to take the interest conveyed to her by the will in lieu of her dower, or must renounce the will and take her dower. An election is frequently necessary when the law provides more than one means of redress for an injury, or more than one means of punishment for a crime. Thus when a new remedy is created by statute without abolishing the remedy at common law, the plaintiff may elect which remedy he wishes to pursue. When two or more distinct remedies are provided by law for the redress of an injury, the plaintiff usually is required to elect which he will adopt, and thereafter is precluded from the use of the others.

ELECTION LAWS. In the United States, the state legislatures have jurisdiction to enact laws governing the manner in which elections shall be held, and the qualification of voters, subject to certain constitutional restrictions. Congress has the power, however, to fix the time at which the election of Federal officers shall be held, and the constitution of the United States provides that the President and Vice-President shall be elected by electors appointed by the different states, in such manner as the state legislatures may determine. In most of the states any male citizen of the age of twenty-one years, who has been a resident of the state, county and election precinct for the period required by law, except idiots and those who are under sentence of imprisonment in the penitentiary, are entitled to vote. In some states paupers, also, are deprived of the right of suffrage. In some states, in recent years, the right of suffrage has been extended to women to a limited extent, in such matters as school elections, and frequently on questions of local improvement. In a few states the full right of suffrage is accorded to women. Most states have registration laws, requiring voters to register their names and addresses with officers who are appointed for the purpose of keeping registration lists, and who hold sessions at the voting-places on certain days fixed by the statute, generally two or three weeks prior to the day of election. The right to vote comes from the state, and is a state gift. Naturalization (q.v., in these Supplements) is a Federal right, and is a gift of the Union, not of any one state. In nearly one half of the Union, aliens (who have declared intentions) vote and have the right to vote equally with naturalized or native-born citizens. In the other half only actual citizens may vote. The Federal naturalization laws apply to the whole Union alike, and provide that no alien may be naturalized until after five years' residence. Even after five years' residence and due naturalization he is not entitled to vote unless the laws of the state confer the privilege upon him. What is commonly known as the Australian Ballot Law (See BALLOT SYSTEM, AUSTRALIAN, in these Supplements) has been adopted in a more or less modified form in many of the states.

Following is a table showing the qualification of voters in the various states. Those marked with a star have the Australian ballot law in a more or less modified form. See also BALLOT, Vol. III, p. 288; and ELECTIONS, Vol. VIII, p. 2.

QUALIFICATIONS OF VOTERS IN THE SEVERAL STATES.

States.	Requirements as to Citizenship.	Previous Residence Required.				Persons Excluded from Suffrage
		In State.	In County.	In Town.	In Precinct.	
Alabama*	Citizen of the United States, or alien who has declared his intention to become a citizen.	1 year	3 mos.	.....	30 days	Convicted of treason, or other crime punishable by imprisonment, unless restored to rights by governor, and idiots or insane persons.
Arizona*	Citizen of United States, Mexicans under Quintero treaty, and aliens who have declared intention to become citizens.	6 mos.	10 days	.....	10 days	Idiots, insane, and persons convicted of any infamous crime.
Arkansas*	Citizen of United States, and aliens who have declared intention to become citizens. Voter must be able to show poll-tax receipt.	1 year	6 mos.	.....	1 mo.	Idiots, insane, and those convicted of felony, until pardoned.
California*	Citizen by nativity, naturalization or treaty of Queretaro. Naturalization must be 90 days before election day.	1 year	90 days	.....	30 days	Chinese, insane, embezzlers of public moneys, and those convicted of infamous crimes.
Colorado*	Citizen, or alien who has declared intention to become citizen 4 months before election day. Women may vote at all elections, under same restrictions as men.	6 mos.	90 days	.....	10 days	Persons under guardianship, non compos mentis insane, or confined in a public prison
Connecticut*	Citizen of United States who can read constitution or statutes in English and who has good moral character. Women may vote at school elections.	1 year	.....	6 mos.	.....	Persons convicted of any offense for which infamous punishment is inflicted, unless restored to rights by general assembly.
Delaware*	Citizen of the age of 21 years. Any one more than 22 years of age must show that he has paid county tax the preceding year.	1 year	1 mo.	.....	. ....	Idiots, insane persons, paupers and felons.
Florida†	Citizen of United States who has paid capitation tax 2 years, if he has resided that long in the state.	1 year	6 mos.	....	.....	Persons insane, under guardianship, convicted of felony or infamous crimes, or guilty of betting on elections, or dueling.
Georgia	Citizen of United States.	1 year	6 mos.	.....	.....	Idiots, persons insane, or convicted of crime punishable by imprisonment, unless pardoned.
Idaho*	Citizen of United States. Women may vote at school elections.	6 mos.	30 days	.....	.....	Persons under guardianship, insane, convicted of infamous crime, unless restored to civil rights, Indians not taxed, polygamists and Chinese.
Illinois*	Citizen of United States. Women may vote at school elections.	1 year	90 days	30 days	30 days	Convicted of crime punishable by imprisonment in penitentiary, until pardoned and restored to rights.
Indiana*	Citizen of United States, or alien who has declared intention to become citizen, and resided 1 year in United States and 6 months in state.	6 mos.	.....	60 days	30 days	Persons convicted of felony or misdemeanor, during the period of imprisonment.
Iowa*	Citizen of United States.	6 mos.	60 days	.....	.....	Idiots, insane persons and those convicted of infamous crimes.
Kansas*	Citizen of United States, or alien who has declared intention to become citizen. Women may vote at school elections.	6 mos.	.....	.....	30 days	Idiots, insane persons, convicts, rebels, public embezzlers, unless restored to civil rights.
Kentucky*	Citizen of United States. Women may vote for school trustees under certain limitations.	1 year	6 mos.	.....	60 days	Idiots, insane persons, and those convicted of treason, felony, election bribery, etc., unless pardoned.
Louisiana	Citizen of United States, or alien who has declared intention to become citizen.	1 year	6 mos.	.....	30 days	Idiots, insane persons, and those convicted of crime punishable by imprisonment in the penitentiary.
Maine*	Citizen of United States who can read the constitution in English.	3 mos.	3 mos.	3 mos.	.....	Paupers, persons under guardianship and Indians not taxed.
Maryland*	Citizen of United States.	.....	6 mos.	.....	.....	Persons under guardianship, lunatics, and those over 21 years of age who are convicted of infamous crimes, unless pardoned.
Massachusetts*	Citizen who can read constitution in English, write, and who has paid tax within 2 years. Women can vote for school committeemen.	1 year	.....	6 mos.	30 days	Paupers (except honorably discharged United States soldiers and sailors) and persons under guardianship.
Michigan*	Citizen, or an inhabitant who has declared intention to become citizen 6 months before election. Women may vote at school, village and city elections.	3 mos.	.....	10 days	10 days	Duelists and accessaries.
Minnesota*	Citizen of United States and civilized Indians. Women may vote at school elections. §	6 mos.	.....	.....	30 days	Persons convicted of treason or felony, unless restored to civil rights, and persons under guardianship, or insane.
Mississippi*	Citizen of United States who can read or understand constitution, and who has paid all his taxes for 2 years and can show receipt therefor.	2 years	1 year	.....	1 year	Insane persons, Indians not taxed, felons, persons who have not paid all taxes assessed against them in last two years.
Missouri*	Citizen of United States, or alien who has declared intention to become citizen not less than 1 year nor more than 5 years before offering his vote.	1 year	60 days	60 days	.....	Paupers, convicted criminals, unless pardoned, and felons and violators of suffrage laws convicted a second time.
Montana*	Citizen of United States. Women may vote at school elections, and, when tax-payers, on questions submitted to vote of tax-payers.	1 year	30 days	.....	.....	Insane persons, felons not pardoned, and inhabitants of Indian or military reserves.
Nebraska*	Citizen of United States or alien who has declared intention to become citizen 30 days prior to day of election. Women can vote at school elections, under certain limitations.	6 mos.	40 days	.....	10 days	Idiots, insane persons, and those convicted of treason or felony, unless restored to civil rights.
Nevada*	Citizen of United States.	6 mos.	30 days	.....	.....	Idiots, insane persons, and those convicted of treason or felony, unless restored to civil rights; Mormons.
New Hampshire*	Inhabitant, native or naturalized. Women may vote for school trustees.	6 mos.	.....	6 mos.	.....	Paupers (except honorably discharged United States soldiers and sailors) and persons excused from paying taxes at their own request.
New Jersey*	Citizen of United States. Women may hold office of school trustee, but are not entitled to vote.	1 year	5 mos.	.....	.....	Idiots, insane persons, and those convicted of crimes (unless pardoned) for which the constitution, when adopted, excluded them from being witnesses.
New Mexico	Citizen of United States.	6 mos.	3 mos.	.....	30 days	
New York*	Citizen who shall have been such for 10 days prior to election. Women may vote for school officers.	1 year	4 mos.	.....	30 days	Convicted of bribery or any infamous crime, unless pardoned; those who bet on any election at which they offer to vote, election bribers and those who accept such bribes.
North Carolina	Citizen of United States.	1 year	90 days	.....	.....	Idiots, lunatics and those convicted of felony or other infamous crime, unless restored to civil rights.

* Australian ballot, or some modified form thereof. † Secret ballot, but not resembling the Australian system.
§ By statute of 1895 a foreign-born resident must be a naturalized citizen, and resident in the state for 5 years, before he can vote.

QUALIFICATIONS OF VOTERS IN THE SEVERAL STATES—*Continued.*

States.	Requirement as to Citizenship.	Previous Residence Required.				Persons Excluded from Suffrage.
		In State.	In County	In Town.	In Precinct.	
North Dakota*	Citizen of United States, aliens who have declared intention to become citizens, and civilized Indians. Women may vote for school directors.	1 year	6 mos.	.....	90 days	Persons non compos mentis and felons, unless restored to civil rights.
Ohio*	Citizen of United States. Women may vote at school elections.	1 year	30 days	.....	20 days	Idiots, insane persons and felons, unless restored to civil rights.
Oklahoma*	Citizen of United States, native or naturalized, and civilized Indians not members of any tribe. Women may vote at school elections.	6 mos.	.....	...	.....	Persons convicted of bribery or felony, unless restored to civil rights.
Oregon*	Citizen of United States, or alien who has declared intention to become citizen 1 year preceding election. Women who pay taxes may vote at school elections.	6 mos.	.....	.....	.....	Idiots, insane persons, Chinese and those convicted of crimes punishable by imprisonment in penitentiary.
Pennsylvania*	Citizen of United States at least 1 month prior to election, and, if 22 years old, must have paid tax within 2 years, or if once having been a voter in the state, upon coming back into state 6 months.	1 year	.....	.....	2 mos.	Non-taxpayers and those convicted of election bribery
Rhode Island*	Citizen of United States. Must have property of $134 assessed valuation to vote on tax questions. If has real estate of such value in the town, need reside in state only 1 year to vote.	2 years	.....	6 mos.	.....	Paupers, lunatics, persons non compos mentis or under guardianship, and those convicted of bribery or infamous crime, unless restored to civil rights.
South Carolina	Citizen of United States.	1 year	60 days	.....	.....	Paupers, insane persons, and those convicted of treason, murder or other infamous crime, or of dueling.
South Dakota*	Citizen of United States, or alien who has declared intention to become citizen. Women can vote at school elections. Voter must have resided 1 year in United States.	6 mos.	30 days	.....	10 days	Idiots, persons insane or under guardianship, and those convicted of felony or treason, unless restored to civil rights.
Tennessee*	Citizen of United States who has paid poll tax. Receipt must be produced, to entitle one to vote.	1 year	6 mos.	.....	.....	Persons convicted of bribery or other infamous crime, unless restored to civil rights.
Texas†	Citizen of United States, or alien who has declared intention to become citizen.	1 year	6 mos.	.....	.....	Idiots, lunatics, paupers supported by county, and those convicted of felony
Utah†	Citizen of United States who has been such for 60 days. Women are accorded full right to vote under same qualifications as men.	1 year	4 mos.	.....	60 days	Idiots, insane persons, and those convicted of treason, or crime against elective franchise, unless restored to civil rights.
Vermont*	Citizen of United States. Women may vote at school elections Voter must have taken freeman's oath, and must be of good behavior.	1 year	.....	3 mos.	.....	Felons, unless restored to civil rights, and deserters from United States military or naval service during war, unless pardoned.
Virginia*	Citizen of United States.	1 year	3 mos.	.....	30 days	Idiots, lunatics, and those convicted of election bribery, embezzlement of public funds, treason, felony, petty larceny, duelists and abettors, unless disability removed by legislature
Washington*	Citizen of United States. Women may vote at school elections.	1 year	90 days	30 days	30 days	Idiots, insane persons, Indians not taxed, and those convicted of infamous crime, unless restored to civil rights.
West Virginia*	Citizen of the state.	1 year	60 days	.....	.....	Paupers, persons of unsound mind, and those convicted of treason, felony or election bribery.
Wisconsin*	Citizen of United States, or aliens who have declared intention to become citizens, and civilized Indians not members of any tribe. Women may vote at school elections.	1 year	.....	.....	10 days	Persons insane or under guardianship, and those convicted of treason or felony, unless restored to civil rights.
Wyoming*	Citizen of United States or alien who has declared intention to become citizen. Women are accorded full right of suffrage.	6 mos.	30 days	.....	.....	Idiots, persons insane or under guardianship, and felons convicted in the state, unless pardoned. Those who bet on elections may not vote at election upon which bet is made.

* Australian ballot, or some modified form thereof.

† Secret ballot, but not resembling the Australian system.

ELECTORAL COMMISSION, a special commission appointed by act of the United States Congress, approved Jan. 29, 1877, for the purpose of determining the electoral votes of the States of Florida, Louisiana, and South Carolina, and of one vote of the state of Oregon, in the Presidential election of November, 1876. See United States, Vol. XXIII, p. 787.

ELECTORAL CROWN, or, more properly, Cap, was a scarlet cap, turned up with ermine, which was worn by the electors of the German Empire. It was closed with a demi circle of gold, covered with pearls, and on the top was a globe with a cross on it, also of gold.

ELECTORS, in general, those having the right, power or privilege of electing, being by law qualified to take part in an election. Specifically, the term is used of the Princes of Germany, who, formerly, were entitled to elect the Emperor. As to these, see Prince, Vol. XIX, p. 739. The more modern and general use of the term is to describe the members of the electoral college of the United States. On the Presidential election day, instead of voting directly for the President and Vice-President, the qualified electors of each state vote for as many electors as their state has Senators and Representatives in Congress. The electors thus chosen constitute the electoral college. These meet in their respective states on the second Monday of the January following the election day, and vote by ballot for President and Vice-President. Three lists of the persons voted for, and the number of votes received by each, are certified to by all the electors and sealed. One list is deposited with the United States district court judge of the district in which the electors meet; the other two are sent to the President of the United States Senate, one by mail and one by messenger. On the second Wednesday of February the lists from the several states are opened by the president of the Senate, in the presence of the two Houses of Congress, and the votes are counted. The candidates receiving the highest number of votes are declared to be duly elected. A movement has been started by some of the more recent political parties to abolish the

electoral college, and to elect all officers by direct vote. Under the present system it is possible for a candidate to receive a majority of the popular vote and yet be unsuccessful.

ELECTRA, the sister of Orestes. See ORESTES, Vol. XVII, p. 827.

ELECTRICAL BRAKE. See BRAKE, in these Supplements.

ELECTRICAL FISHES. See EEL, Vol. VII, p. 694; RAY, Vol. XX, p. 299.

ELECTRICAL POTENTIAL. See ELECTRICITY, § 23, in these Supplements.

ELECTRICAL RAILWAYS. See TROLLEY RAILWAYS; and RAILROADS, in these Supplements.

ELECTRICAL UNITS. See ELECTRICITY, § 110, in these Supplements.

ELECTRICAL WELDING. See WELDING BY ELECTRICITY, in these Supplements.

ELECTRIC AND DIELECTRIC. See ELECTRICITY, § 7, in these Supplements.

ELECTRIC BUOYS. See BUOYS, in these Supplements.

ELECTRIC CARS. See CAR-CONSTRUCTION, in these Supplements.

ELECTRIC CURRENTS. See ELECTRICITY, § 38, in these Supplements.

ELECTRIC DISCHARGE. See ELECTRICITY, § 14, in these Supplements.

ELECTRIC FIELD. See ELECTRICITY, §§ 8, 9, 16, in these Supplements.

ELECTRIC FURNACE. See CHEMISTRY, in these Supplements.

ELECTRIC HEATERS. See FURNACES, in these Supplements.

ELECTRIC INTENSITY. See ELECTRICITY, § 20, 21, in these Supplements.

*ELECTRICITY. Although an exhaustive treatise on this subject is to be found in Vol. VIII, pp. 3–105, the advances in theory and application since 1880 require further narration. At the same time, advantage has been taken of the opportunity to present the subject in a way more intelligible to the unspecialized mind in the following article.

I. ELECTROSTATICS.
II. CURRENT ELECTRICITY.
III. ELECTROMAGNETISM.
IV. ELECTROMAGNETIC INDUCTION.

I. ELECTROSTATICS.

§ 1. DEFINITION. In the study of the phenomena of radiant light and heat we are compelled to assume the existence of a medium pervading all space, and which is called the ether. Its structure is assumed to be continuous, as compared with ordinary matter; its density cannot be measured directly, but can be shown to be so small as not to interfere with the motion of bodies through it. Its function, in the case of the above phenomena, is solely that of a medium capable of being thrown into a state of vibration by vibrating molecules, of transmitting these vibrations throughout its substance, in the form of transverse waves, and of causing vibration of the molecules upon which these waves happen to fall, that is to say, the transmission of molecular energy across space by means of waves.

To satisfactorily explain electrical phenomena, it is necessary to assume the existence of a substance similar to the ether in its properties, but associated with matter in an entirely different manner. To this substance is given the name of electricity.

It is not unlikely, but highly probable, as Faraday suggests, that the ether should have other uses than simply the conveyance of radiation. Many of the leading physicists believe the ether and electricity to be the same thing If they are not identical, there is certainly an intimate relation between them, which is shown by Maxwell in the development of his electro-magnetic theory of light. However, whether electricity and the ether be the same or not, we may safely assume, for the present, that electricity is neither energy nor matter, in the common sense, but a peculiar and distinct form of matter; that it is indestructible; that it can be moved from one place to another, energy being expended in moving it. It can be associated, or connected, with ordinary matter in a manner which is not clearly understood, and changes in its normal relationship to matter give rise to electrical phenomena.

The reason why electrical phenomena remained so long obscure can only be explained by the fact that they do not occur naturally as often as the phenomena of heat and light, and that there is no electrical sense corresponding to the sense of sight and touch. The laws concerned in electrical phenomena are now quite well understood, and evidence confirming the above assumptions in regard to the nature of electricity is rapidly being produced.

§ 2. ELECTRIFICATION. If a stick of sealing-wax is rubbed with a well-dried piece of flannel, it is found to possess a new property; namely, that of attracting light particles of paper, pith, dust, and like substances. It is found, also, that after the particles come in contact with the sealing-wax, they are then repelled. This may be shown more strikingly by suspending a gilded pith-ball by a fine silk thread long enough to permit the ball to move freely. The pith-ball is first attracted, and then repelled after contact with the wax; moreover, if we present the flannel to another pith-ball similarly suspended, exactly the same phenomena is observed. *Both* the wax and flannel, by being brought in contact, have acquired this new property, and are said to be *electrified*, or *charged with electricity*.

An enormous number of substances are now known to exhibit this phenomenon, but from about 600 B.C. to A.D. 1600, amber and jet were thought to be the only substances capable of being electrified. Thus the oldest electrical phenomenon known to science is an exceedingly interesting and important one, as it involves the fundamental principles of electrostatics, and may be regarded as the typical phenomenon to which, in one form or another, it will frequently be necessary to refer. We may picture to ourselves what

*Copyright, 1897, by The Werner Company.

takes place when the wax and flannel are brought in contact, by supposing that electricity passes from one to the other, thus leaving each substance changed as to its normal amount of electricity; one would have too little, and the other too much: the deficit in the one case would exactly equal the excess in the other. Furthermore, the bodies, being now in different conditions, ought to exhibit different properties; but thus far they have behaved exactly alike when brought near the suspended pith-ball.

Electrification is not to be confused with electricity. Electrification always involves a change in the normal amount or condition of the electricity a body contains; the change requires the expenditure of energy for its production, and energy is given out when the electricity reverts to its normal condition. In the same sense that heat is not matter, but the energy which matter contains because of the motion of its molecules, so electrification is not electricity, but the energy electricity possesses by virtue of its displacement.

§ 3. Two Kinds of Electrification. If two suspended pith-balls, A and B, are touched by the electrified sealing-wax, they are found not only to be repelled by the wax, but repel each other The two pith-balls must be in like condition, for they have been similarly treated. If another pair, C and D, are brought in contact with the flannel with which the wax was rubbed, they, also, are repelled by the flannel, and repel each other; but if the flannel be brought near the first pair, they are attracted by it, and the second pair is found to be attracted by the wax. Furthermore, either of the balls, A and B, are attracted by C and D; hence the wax and flannel are found to have different properties, as before predicted. To return to the illustration used, the one which has too much repels a body in the same condition, and attracts one in the opposite state; also, the one with too little repels a body in the same condition, and attracts the other. No matter what substances are brought in contact, if electrification be produced it is found to be one of these two kinds. The terms *positive* and *negative*, as used in connection with electrified bodies, are conventional terms to denote which of the two states a body is in. If glass is rubbed with silk, the glass, and all other bodies which behave like it when electrified, is said to be in a state of *positive electrification*, while the silk and other bodies similarly electrified are in a state of *negative electrification*. It must be borne in mind that the terms *positive* and *negative* refer to *electrification*, and not to *electricity*.

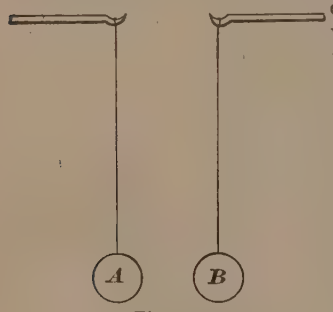


Fig. 1.

§ 4. Other Sources of Electrification. Friction is not the only way electrification is produced: chemical action, percussion, physiological action, and other disturbances in the condition of matter, also bring about disturbances in the electric condition of the body. It is quite possible that these cases may all be ultimately reduced to that of contact.

Electrification is also produced by induction—a process to be explained later, and which we shall see is really a redistribution of electrification which has been produced in some other way.

§ 5. Both Kinds of Electrification Always Produced. Perhaps the most important fact or principle in electrostatics is, that whenever electrification is produced, *both* kinds appear simultaneously—one on the substance rubbed and the other on the rubber; furthermore, they appear in *exactly equal amounts*, which may be shown in a number of ways.

§ 6. Insulators and Conductors. If, in § 3, the balls, A and B, after being in contact with the electrified wax, are touched with a rod of glass or hard rubber, no change in the effect is noticed; when the balls are brought near each other, they still repel. But if A and B are touched with a metal wire held in the hand, they no longer repel. Thus the balls lose their charge when touched with the metal, but do not in the case of the glass or hard rubber. It is customary, then, to divide bodies into two classes, as follows: Those which, when placed in contact with a charged body, cause a loss or redistribution of the electrification, and those which do not. The former are called *conductors*, and the latter *insulators*. To the first class belong the metals, solutions of salts and acids; metals heading the list as the best conductors. In the second class are found dry air, silk, glass, hard rubber, paraffine, sulphur, fats, oils, and resin.

§ 7. Electric and Dielectric. When a conducting body is entirely surrounded by an insulator, it is spoken of as an insulated conductor, and the insulating material is usually referred to as the dielectric. The term *electric* was formerly used to denote a conducting material, but the term is now obsolete.

§ 8. Electric Field. Let A and B (Fig. 2) be two surfaces which become electrified when brought in contact. The charges developed, being of opposite kind, attract each other; therefore work must be done in order to separate the surfaces, and the medium between the surfaces is left in a peculiar state of stress. A charge of electrification placed anywhere in the region between the surfaces experiences a force urging it toward one surface or the other, depending upon its kind. This region (or field of force) is called the *electric field of force*, or simply *electric field*.

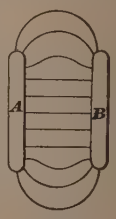


Fig. 2.

§ 9. Representation of the Electric Field by Lines and Tubes of Force. It is convenient to represent the electric field by lines of force. These begin at the positively charged surface, and end on the surface negatively charged; they never

cross, and their direction at every point is that of the electric force at that point. The stress in the medium represented by those lines acts as a tension along the lines, and is the force which draws the two surfaces together. There is also, in the medium, a pressure at right angles to the lines; hence the lines tend to *shorten* and *separate*.

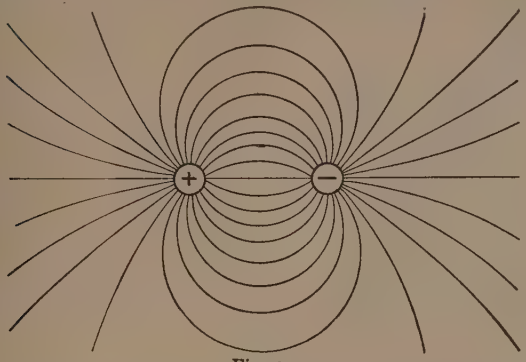


Fig. 3.

Fig. 3 shows the field between two equally and oppositely charged spheres, mapped out by lines of force.

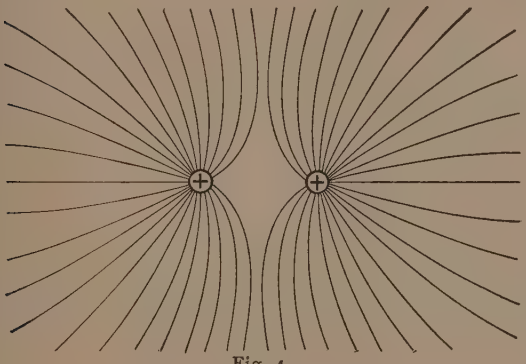


Fig. 4.

Fig. 4 represents the field between two equal positive charges; in this case the lines of force do not pass from one to the other, but travel off to an infinite distance.

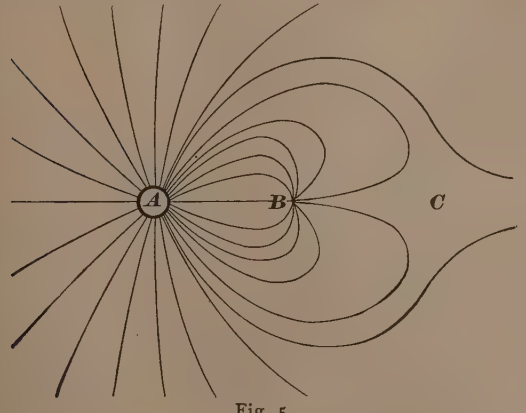


Fig. 5.

Fig. 5 shows the lines of force when a positive charge equal to 4 at A, and negative charge of—1 at B, are used. A being numerically stronger than B, lines starting from A will not fall on B, but pass off to infinite distance.

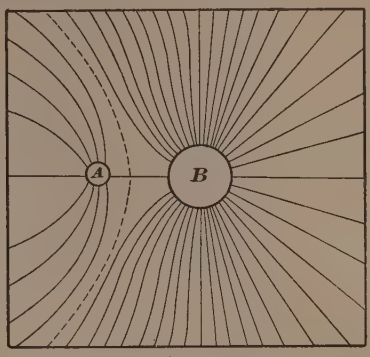


Fig. 6.

Fig. 6 shows the field of force due to a charge 1 at A, and a like charge 4 at B.

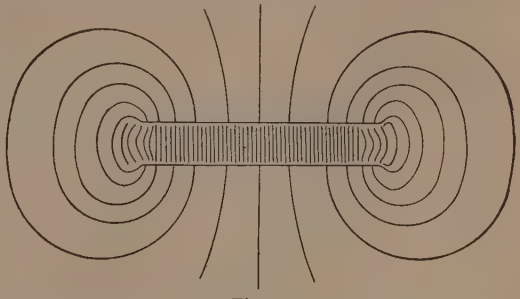


Fig. 7.

Fig. 7 shows the field of force between two parallel planes. At the edges its lines of force curve out. Some pass from the back of one plane to the back of the other.

§ 9a. Tubes of Force. Imagine a small plane surface placed in an electric field perpendicular to the lines of force at that point.

We may consider all the lines of force which pass through the boundary of the small plane as forming a tube of force which starts from the surface of the positive charge and ends at the negative.

Since the sides of the tube are lines of force, the cross-section of a tube of force at any point must be proportional to the electric intensity at that point.

We may imagine each tube as inclosing one unit of positive electrification at the origin and a unit of negative electrification at the end. These tubes are in a state of tension along the lines of force and a state of pressure at right angles to the line.

Faraday introduced this method of representing the force in the electric field, and solved, by means of it, many of the problems in electrification without the aid of mathematical analyses.

§ 10. Conductors and Non-Conductors Further Defined. It is evident from the way in

which the electric field is produced (§ 8) that the lines of electric force cannot exist in a conductor; therefore a conductor may be further defined as a substance which cannot sustain electrostatic stress, and which permits the flow of electricity through it when such stress is applied. On the other hand, when electrostatic stress is applied to a dielectric, something of the nature of a displacement of electricity takes place all along the line, causing, as it were, an equal amount to appear on the opposite surface. This displacement is proportional to the stress applied, and disappears when the stress is removed.

§ 11. A Charge, or Charged Conductor. It is well to keep in mind all that is included in the term *charged conductor;* namely, one of two equal and opposite charges separated by a *dielectric* in a *state of stress*, or as it is called, an *electric field.* There is no such thing as a single charge; its equal and opposite is somewhere on the earth or surrounding conductors. The intensity of the field at any point varies with the distance between the conductors, their shape, and the dielectric which separates them. When we speak of a single isolated charge, it is understood that the opposite is at a great distance from it. In the case of the two spheres (§ 9, Fig. 3), if one of them be removed to a great distance, the field of force about the other can be represented by Fig. 8; the lines of force are radial and equally distributed about the surface.

Fig. 8.

§ 12. Electrification by Induction, or Influence. It is found that when an insulated conductor is introduced into the field about a charged conductor it becomes electrified with equal quantities of positive and negative electrification; further, if it then be connected with earth, the charge, which is like that on the original charged body, disappears, while that which is opposite in sign, remains. The conductor is then said to be charged by *induction*; but as the term *induction* has other uses, the term *influence* is sometimes preferred.

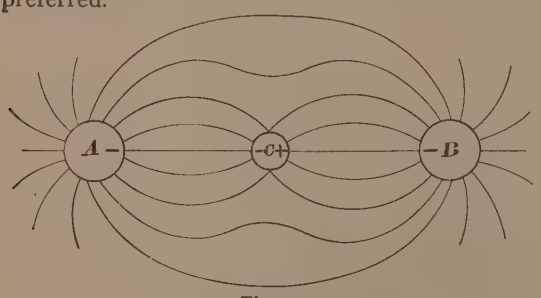


Fig. 9.

Let A be the positively charged conductor (Fig. 9.), and let B represent the equal and opposite charge which, we have seen, always exists somewhere When the conductor C is introduced into the eld, some of the lines of force are divided, since they cannot exist in a conductor. We have lines ending on the side of C nearest A, and an equal number beginning on the side opposite to A, hence the side opposite A is charged positively, and the side near A is charged negatively, and, moreover, the charges are equal. Now, if the body C moves toward A until it touches A, the lines between A and C no longer exist, and some of the lines which were before on A are now on C, or, as we say, the body C has been charged by conduction; i. e., has taken from A a part of its charge. But if the body C is taken, instead, toward B, the equal and opposite charge, and touches it, C shares with B the lines which are on it, or, what amounts to the same thing, we may connect C with B by means of a conducting wire; the surface of C then becomes electrically a part of the surface of B, and, being the part nearest A, will receive most of the lines of force. If, now, the connection between B and C is broken, we have the charge which was originally on B divided between B and C, the part on C depending upon its nearness to A when the contact was broken; hence we see that a charge given by induction is a charge by conduction, as in the first case, except that a part of the equal and opposite charge is given up to the conductor, C.

§ 12a The Electrophorus. The electrophorus is an instrument for the production of electrification by induction, or influence. It consists essentially of a resinous cake, A, a conducting lid, B, with its insulating handle, C (Fig. 9a). The cake is electrified on its upper surface by beating it with a cat's skin (or other convenient substance), which electrifies it negatively, as above, at (1), (Fig. 9a). The charge on the cat's skin finds it way to the earth, or neighboring conductor. The lid, when placed near the cake, is electrically between the charge on the cake and the equal and opposite charge; hence it intercepts most of the lines, and is charged both positively and negatively, as shown at (2). The lid is now connected with the earth by touching it with the finger; hence the surface of the lid becomes a part of the earth's surface, and the equal and opposite charge is now nearly all on the lid; if

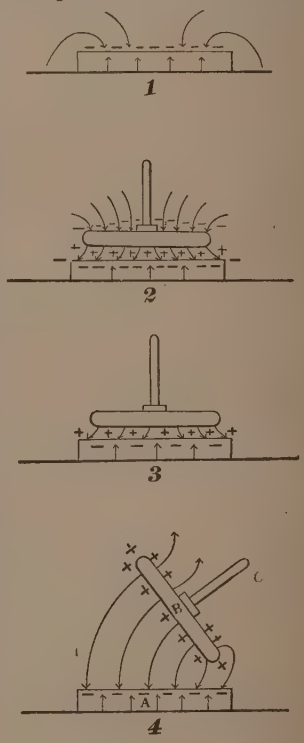


Fig. 9a.

the connection between the lid and the earth is broken, the lid may be removed and its charge used to do work in charging other conductors, etc. In actual use the lid is placed on the surface, but as the cake is a non-conductor, and the lid touches it only at a few points, it is electrically "near" the cake.

It is evident that the process can be repeated as often as we choose, but the electrification is produced only by the expenditure of energy.

Influence or static machines, as they are called, are but mechanical devices for performing automatically the processes described in connection with the electrophorus, thus producing a constant supply of electrification at the expense of the mechanical work necessary to operate the machine against electrical attraction.

§ 12b. The Wimshurst Influence-Machine. Fig. 9b shows the Wimshurst machine; it is perhaps the simplest and most effective machine of this class, and an explanation of its action will

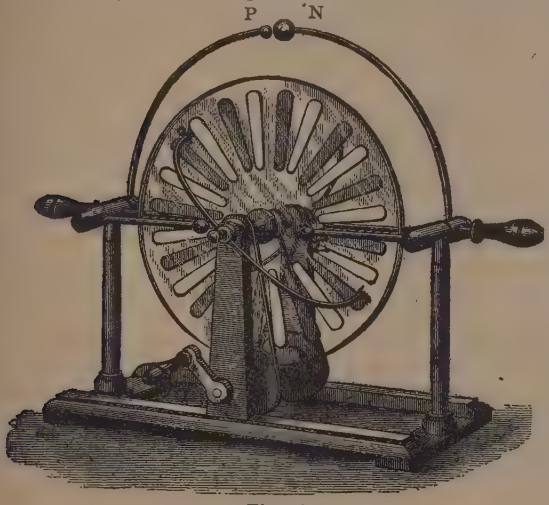


Fig. 9b.

suffice for all. The two glass plates rotate in opposite directions, and have attached to their outer surfaces segments of tin foil, as shown in the figure. The action of the machine can best

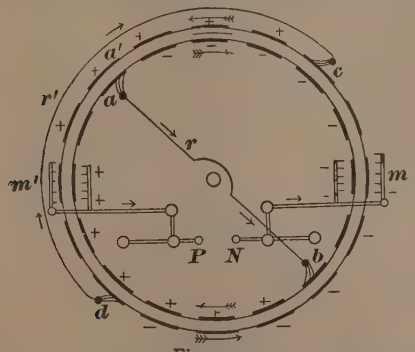


Fig. 9c.

be understood by reference to Fig. 9c, where the disks are shown as cylinders, in order that both may be seen at once. Suppose a segment, a', on the back plate, to have a slight positive charge; as the first segment a passes a', a is acted on by induction, and receives a slight negative charge, the equal positive charge appearing on b, which is connected with a, at the moment, by the brushes and connector r.

These charges are carried forward until they are opposite c and d, which at this moment are connected by the brushes and connector, r', of the rear plate; c and d will then receive, by induction, positive and negative charges, and these, passing onward, act on the front segments, under a and b. The charges on all the sections will thus be built up by a reciprocal action, the front sections on the upper half carrying negative charges from left to right, and the back sections carrying positive charges from right to left. The sections on the lower part of the plate, are passing through a similar, but inverse, set of operations; hence the negative charges are carried by both plates to the collector, m, which is connected with the terminal N, and positive charges are carried to m' in connection with the other terminal, P. P and N become highly charged, the air between them ceases to resist the stress, and a discharge takes place across the gap. The terminals may be connected with any body which it is desired to charge; as, for example, a Leyden jar. The small initial charge necessary to start the action is probably acquired by the friction of the plates and air. It is evident that if P and N be supplied with electrification from another source, the machine would work backward as a motor.

§ 13. Unit-Charge. Unit-charge of electricity is defined as that charge such that two bodies having this charge repel each other with unit force (one dyne) when separated by unit distance. The dielectric is taken as air, and the dimensions of the bodies are assumed to be small, as compared with unit distance.

§ 14. The Electric Discharge. We have seen that every electric charge is essentially of two equal and opposite charges separated by a dielectric which is in a state of stress. We have assumed that the cause of this state of the bodies and dielectric is, first, the unequal distribution of the electricity which the bodies naturally contain; and second, their separation. Let A and B (Fig. 10) represent the two equal and oppositely charged conductors; then, if A and B are brought in contact, the electrification disappears, and the bodies are said to be discharged. Instead of bringing them in contact, we connect them with a conducting wire, and the same effect is observed. The bodies A and B and the dielectric return to their normal condition, provided A and B are not the two substances which, when in contact, produced the unequal distribution; for in that case the return to the normal condition would be opposed by the very thing which caused the unequal distribution. In

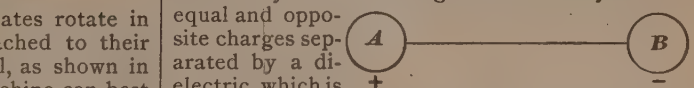


Fig. 10.

case the stress in the dielectric becomes too great, it gives way, and acts for the moment as a conductor, thus allowing the two charges to reunite. This form of the discharge is usually accompanied by a sharp report and a spark, due to the heat generated in the dielectric along the path of the discharge. It is usually spoken of as the electric spark, or, better, a disruptive discharge, in order to distinguish it from the ordinary discharge through a conductor.

§ 15. Surface Density. If the electrification on the surface of a charged conductor is uniformly distributed over the surface, the amount of electrification per unit area is called the surface density. If the distribution is not uniform, then the surface density at any point is the amount that would be on unit area if it had a uniform distribution equal to that at the point.

§ 16. Intensity of the Electric Field. If a small body charged with unit positive electricity is placed at any point in an electric field, the force which it experiences is the measure of the electric intensity at the point.

§ 17. Force between Charged Bodies. Coulomb demonstrated, experimentally, by means of the torsion balance, that the force between two charged bodies, which are small as compared with the distance between them, is proportional to the product of the charges, and inversely proportional to the distance between them; hence it follows from the definition of unit charge that the force between two small charged bodies in air is $\frac{q\,q'}{r^2}$, q and q′ being the charges on the bodies, and r the distance between them. If q and q′ are both positive, or both negative, the expression is positive, but if they are unlike in sign, it is negative; hence the positive sign denotes repulsion, and the negative attraction.

§ 18. Total Normal Induction Over a Surface. If an imaginary surface be placed anywhere in an electric field, we may suppose it to be completely divided up into elementary surfaces so small that the electric intensity at any point in an element may be regarded as constant.

If the intensity at a point in each element be resolved along the outward-drawn normal to the surface at the point, and each element be multiplied by its normal intensity, the sum of all these products is defined as the *total normal induction* over the surface.

§ 19. Gauss's Theorem. A few of the more important cases of electrical intensity will be considered and solved by the aid of Gauss's theorem, which may be stated as follows: *The total normal induction over any closed surface drawn in the electric field is equal to 4π times the total charge of electricity inside the surface.*

To demonstrate the theorem when the field is due to a single charged body, let O (Fig. 11) be the body, the dimensions of which are small as compared with the distance to the surface, and q the charge on the body. Let A, B, C, D be one of the elementary surfaces. Through O, with unit radius, describe a sphere, and denote, by a, the portion of this surface included between the lines drawn from O to A, B, C and D. Draw another sphere through A, with O A as a radius, and let a' be the portion of this surface included between the same

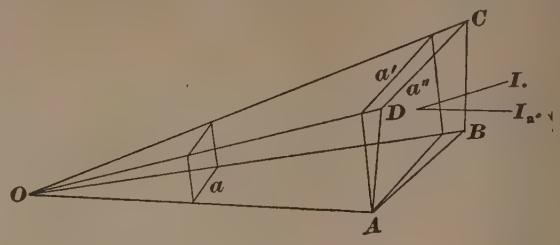


Fig. 11.

lines. Then a and a', being portions of spheres having the same center, and subtending the same solid angle, are to each other as the squares of their radii; hence $a : a' :: 1^2 : \overline{OA}^2$, or $a = \frac{a'}{\overline{OA}^2}$; the intensity at any point on a'' is $\frac{q}{\overline{OA}^2}$, the induction over the element a'' is $a''\frac{q}{\overline{OA}^2}$. Let α be the angle between the planes a' and a'', which is equal to that between the normals I and I_n, then the induction normal to a' is $a''\frac{q}{\overline{OA}^2}\cos\alpha = a'\frac{q}{\overline{OA}^2} = q\alpha$, since $a''\cos\alpha = a'$ and $\alpha = \frac{a'}{\overline{OA}^2}$; that is to say, the portion of the normal induction due to the element a'' is equal to q multiplied by the area on the unit sphere subtended by the same solid angle; and the normal induction over the whole surface is equal to q, multiplied by the area subtended by the surface on the sphere of unit radius and center at O. The normal inductions on any finite portion of the surface will be the sum of the inductions on the elements into which the portion of the surface is supposed to be divided, which is q times the area cut from the sphere of unit radius and center at O, by a cone having the boundary of the surface as its base and the vertex at O. *Case 1.* Let O be inside a closed surface. The normal induction over the surface is q multiplied by the whole surface of the sphere having unit radius and center at O. The area of the unit sphere being 4π, the total induction over the whole surface, due to the charge q inside of it, becomes $4\pi q$. *Case 2.* Let O be outside the closed surface. An elementary cone, with vertex at O,

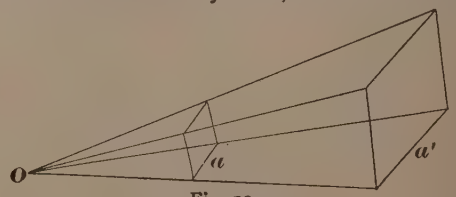


Fig. 12.

cuts from the closed surface the two areas a and a' (Fig. 12). The normal induction over a' is equal to that over a, since each is equal to

q times the area cut from unit sphere by the same cone. The component of the induction on a' is in a direction away from the surface, while that on a is toward the surface; hence they will have opposite signs; and since the whole surface can be divided up into pairs of elementary surfaces, the surfaces of each pair neutralizing each other, the total normal induction for the closed surface will be o.

If the electric field be due to any other distribution of electrification, we may regard it as due to several small charges, q_1, q_2, q_3, . . . etc. If N is the normal induction due to all the charges, q_1, q_2, q_3, etc., and N_1, N_2, N_3, . . . etc., the induction on an element of the surface by q, q_1, q_2, etc., then $N = N_1 + N_2 + N_3 + \ldots$ etc.; if a is the area of an element of the surface, $\Sigma N a = \Sigma N_1 a + \Sigma N_2 a + \Sigma N_3 a$, . . . etc.; that is, the total normal induction over the surface due to the field is equal to the sum of the normal inductions due to the several small charges to which the field is supposed to be due. But since the normal induction over a closed surface due to a charge inside it is 4π times the charge, and o, if the charge is outside the surface it follows that the sum of the inductions over the surface due to the several charges is 4π times that part of the total charge which is inside the closed surface over which the normal induction is taken.

§ 20. Cases of Electric Intensity. The following cases, solved by Gauss's theorem, are very important:

(*a*) *Electric intensity at a point outside a uniformly charged sphere.* Let P (Fig. 13) be the point and O the center of the sphere. Through P draw a sphere with the center at O. Since the sphere is uniformly electrified, the direction of the force at P will be along O P; and it will have the same value at any point on the sphere with radius OP. Call this value f. Since at all points on this surface the normal force is f, the total normal induction over the spherical surface is f multiplied by the surface of the sphere, which is $f(4\pi \times \overline{OP}^2)$; but by Gauss's theorem this is equal to 4π times the total charge inside the surface. Let q be the total charge; then $f \times 4\pi\overline{OP}^2 = 4\pi q$ and $f = \frac{q}{\overline{OP}^2}$. Hence the charge may be considered as concentrated at the center of the sphere O, so far as the intensity at P is concerned. Had we known that the charge on O exerts the same force at P as if it were concentrated at the point O, the expression for the intensity at P could have been written out directly from the law of inverse squares.

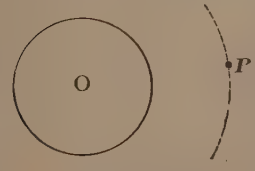


Fig. 13.

Fig. 14.

(*b*) *Electric intensity at a point inside a uniformly charged spherical shell.* Let P (Fig. 14) be the point inside the shell, and f the electric intensity at the point. Through P draw a spherical surface with center at O. Since the charge is symmetrical about this surface, f, the normal intensity will be the same at all points on the surface, and the total normal induction will be $f(4\pi \times \overline{OP}^2)$, which, by Gauss's theorem, is 4π times the charge inside the spherical surface passing through P. There is no charge inside the surface; hence $f(4\pi \times \overline{OP}^2) = o$; therefore $f = o$. There is then no electric intensity at a point inside the uniformly electrified shell.

(*c*) *Electric intensity at a point outside of an infinitely long circular cylinder uniformly charged.* Through P (Fig. 15) describe a cylinder having the same axis as the charged cylinder. Cut a right section from each cylinder by two planes at unit distance apart. Since the electrified cylinder is infinitely long and symmetrical about its axis, the intensity at any point outside the charged cylinder will be along the radius through the point, and will be the same for all points at the same distance from the charged surface.

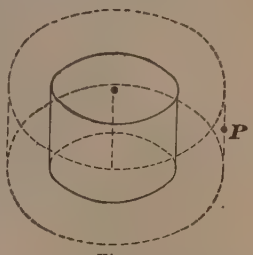


Fig. 15.

The intensity at any point on the plane ends of the cylinder through P will be in the plane of the ends; hence the normal induction on these two ends will be o, and the total normal induction will be that on the curved portion of the section only. Let f be the intensity at the point P, then the total normal induction is $f(2\pi r)$, r being the distance of P from the axis, and the length of the section unity. Let q be the charge per unit length on the electrified cylinder; then by Gauss's theorem the total normal induction over the unit section is $4\pi q$; therefore $f(2\pi r) = 4\pi q$, and $f = \frac{2q}{r}$; hence it is seen that the electric intensity varies inversely as the distance from the axis of the cylinder. It can also be shown that the electric intensity at any point inside the charged cylinder is o.

(*a*) *Electric intensity at a point due to an infinite plane uniformly electrified.*

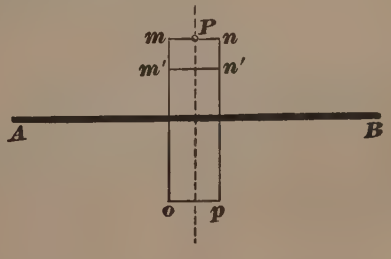


Fig. 16.

Let A B (Fig. 16) be a portion of the plane, and P the point. It is evident that the intensity will

be normal to the plane, and the same for all points equally distant from the plane. Through the point P draw a line perpendicular to the surface, and take this as the axis of a right cylinder, m, n, o, p, extending equal distances above and below the plane, the point P lying in the upper base of the cylinder. The electric intensity is everywhere parallel to the axis of the cylinder; hence there is no normal component over the curved surface. The total normal intensity is therefore due to the plane ends of the cylinder. Let f be the intensity at any point in the field, and a the area of either base of the cylinder; the total normal induction over the upper and lower bases is $2af$, as the normal intensity is along the outward-drawn normal to each end. Let q be the quantity of electrification per unit area of the plane; then from Gauss's theorem the total normal induction over the cylinder is $4\pi qa = 2fa$; therefore, $f = 2\pi q$. Consider a section cut from the cylinder by a plane, parallel to one of the bases, as at $m'n'$. Let f′ be the electric intensity at any point on this section; then the total normal induction over the portion of the cylinder cut off by the plane $m'n'$ is $fa - f'a'$; but since there is no charge inside this portion of the cylinder, $fa - f'a' = 0$, or $f = f'$; an interesting result, since it follows that the intensity at any point is independent of its distance from the plane.

§ 21. Electric Intensity at the Surface of a Charged Conductor. Let f be the electric intensity at a point, P (Fig. 17), very near to the surface of the charged conductor, O. Consider a small area about P, and through the boundary of the area draw a small right cylinder with its elements perpendicular to the charged surface, and its bases, a and b, parallel to the tangent plane at P. Since the surface of the conductor is an equipotential surface (see § 26), the electric intensity is normal to the surface. The total normal induction over the surface of the cylinder is $f \times b$, where f is the intensity at the point P and b, the area of the base. Since the intensity is parallel to the elements of the cylinder, and the base a is inside the charged conductor, the base b is the only portion of the surface of the cylinder which contributes anything to the normal induction. The amount of electrification inside the small cylinder is δb, where δ is the surface density.

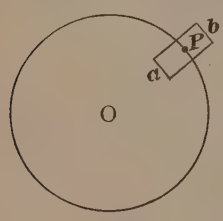


Fig. 17.

By Gauss's theorem, $f\,b = 4\pi\delta b$ or $f = 4\pi\delta$; hence the electric intensity at a point near the surface of a charged conductor is equal to 4π times the surface density at the point, and is at right angles to the surface. This is known as Coulomb's law.

The expression $4\pi\delta$ requires modification in case the conductor is surrounded by any other dielectric than air.

§ 22. Force on Unit Area of a Charged Conductor. Let P (Fig. 18) be a point on the surface. P_1 and P_2 are points very near the surface, and $a\,b$ the small area surrounding P. Let f be the normal electric intensity just outside the surface at P, which may be considered as made up of two parts; f_1 that part due to the electrification on the small area around P; and f_2 the part due to the rest of the electrification; then $f = f_1 + f_2$. Since P_1 and P_2 are close together, the electric intensities at these points, due to the electrification on the parts of the surface other than the small area, may be considered equal; that is to say, the intensities at both points, not due to the electrification on the small area, may be taken as f_2, and is along the outward-drawn normal for each point. The electric intensity at P_1 and P_2, due to the small area, will be the same in magnitude, but opposite in direction, the points being situated on opposite sides of the small area. The total intensity at P_2 is $f_2 - f_1$, which is equal to o, since the point is inside an equipotential surface inclosing no charge. Since

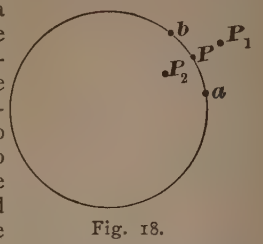


Fig. 18.

$$f_2 - f_1 = 0$$
$$f_1 = f_2$$

and as $$f = f_1 + f_2$$
$$f_1 = f_2 = \tfrac{1}{2}f$$

Let a be the area of the small surface around P, and δ the surface density of the electrification; then $a\delta$ is the charge on the small surface. The normal intensity at the point P, due to the rest of the electrification, is f_2; hence the normal force on the surface is $f_2 a\delta = \frac{1}{2}fa\delta$. If F is the mechanical force acting normally on unit area, Fa is the mechanical force on the small section. Then

$$Fa = \tfrac{1}{2}fa\delta$$
$$\text{and} \quad F = \tfrac{1}{2}f\delta$$

By Coulomb's law (§ 21), $f = 4\pi\delta$

$$\text{and} \quad \delta = \frac{f}{4\pi}$$

$$\text{then} \quad F = \frac{f^2}{8\pi} = 2\pi\delta^2$$

when the dielectric surrounding the charged body is air.

If the electric intensity at the surface of a charged conductor exceeds a certain limit, electrification on each small area is repelled by the rest of the charge with such force that the air ceases to insulate.

§ 23. Electrical Potential. In §§ 16, 18, 19, 20, 21 and 22, we have been considering the force exerted upon unit positive charge when placed at a point in the electric field. There is, however, another equally important quantity involved, namely, the energy required to place the unit charge at the point, or, what is the same thing, the work, that could be done by the unit charge were the electric force allowed to move the unit charge from the point.

Let O (Fig. 19) be a sphere upon which there is

a charge +Q. Since the electric field about the sphere extends to an infinite distance (§ 11), the potential at the point P may be defined as *the*

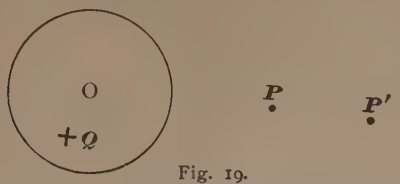


Fig. 19.

work required to bring unit positive charge from an infinite distance to the point, which, of course, is equal to all the work the positive unit could do if the force of repulsion were allowed to move it as far as it could; that is to say, where the electric intensity is zero, or at an infinite distance from O.

In electrostatics it is to be understood that when the term *potential* is used it is an abbreviation of the term *potential energy*. Also, since we have both attraction and repulsion, the work required to bring the unit-charge to the point may be either positive or negative. It is customary to take the sign of the potential the same as the charge to which the potential is due; if —Q is the charge upon the sphere O, the potential at the point P is negative.

§ 24. Point of Zero Potential. At a place infinitely distant from all electrified bodies the electric intensity becomes zero, and hence the potential is zero at that place. A charge given to the earth is practically removed to an infinite distance, since the charge, while distributed on the surface of the earth, may be considered as concentrated at its center so far as attraction is concerned; hence the surface of the earth is usually spoken of as at zero potential.

§ 25. Difference of Potential between Two Points. The difference of potential between two points is the work done in carrying the unit positive charge from one point to the other. The amount of work done in taking the unit charge from one point to the other is independent of the path traversed, which may be shown as follows: Let P and P′ (Fig. 20) be the two points, and suppose that it requires more work to carry the unit charge from P′ to P along the path *a′* than along the path *a*.

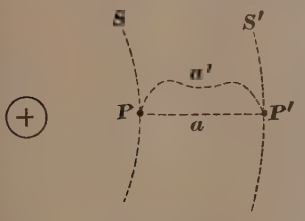


Fig. 20.

By the principle of the conservation of energy, the work the charge is capable of doing in passing from P to P′ over either path is equal to the work done upon the charge when it is taken from P′ to P by the same path. If the supposition is correct, the charge could be taken to P by way of the path *a* and returned by the path *a′*; hence a greater amount of energy would be derived from the charge than was used to take the charge from P′ to P; a result which is impossible, as the system is left exactly the same as at the start.

§ 26. Equipotential Surfaces. A surface drawn in the electric field, such that the potential at every point in the surface is the same, is called an equipotential surface. It is evident that at every point on an equipotential surface the direction of the electric intensity is perpendicular to the surface; for if not, then it may be resolved into two components, one of which is tangent to the surface, and the unit charge would require the expenditure of energy to move it along the surface, which is contrary to the definition of an equipotential surface.

The surface of a conductor placed in an electric field must be an equipotential surface; if not, then, as before, the tangential component of the electric intensity at any point would cause a flow of electricity along the surface of the conductor.

The electric intensity at a point inside of an equipotential surface which does not inclose a charge must be zero; for if the potential inside of the surface varies, then there will be other equipotential surfaces inside the given surface. Consider one very near the given surface, and let P be a point on the inner surface, and P′ the point where the normal to the inner surface at P cuts the given surface. If the potential at P is greater than that at P′, the intensity is everywhere outward along the normal to the outer surface,—a fact which implies a positive charge inside the surface, since by Gauss's theorem the normal induction over a closed surface is proportional to the charge inside the surface. If the potential at the inner surface is less than at the given surface, it can be shown, as before, that this implies a negative charge inside the surface,—either case of which is contrary to the hypothesis.

It follows from the above that no charge can reside on the inner surface of a hollow conductor. This very important fact may be proven by direct experiment in several different ways, one of which is by means of a hollow conductor with a small opening, as shown in Fig. 21. A small insulated conductor is inserted through this opening and brought in contact with the interior surface, but upon withdrawal shows no electrification.

Fig. 21.

Faraday built for himself a room 12 feet each way, and completely covered it with tinfoil, and insulated it from other conductors. This large hollow conductor he charged with his most powerful machine, but no effect was observed upon the most delicate instrument when taken into the interior.

Whenever it is desired to screen an object from electrical action it is surrounded by a conducting surface.

§ 27. Potential Due to a Charged Sphere. Let q be the charge on the sphere having its center at O (Fig. 22). If the charge on O is positive, the unit positive charge, when repelled by the field

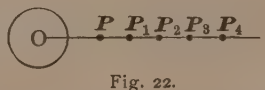


Fig. 22.

from a point, P, to an infinite distance, requires the expenditure of energy by the field equal in amount to that required to bring the positive unit from an infinite distance to the point, which, by definition, is the potential at the point P. Let O P be the line through O and P extended to an infinite distance. $P_1, P_2, P_3, \ldots$ etc., are points on $\overline{O\ P}$ very close together.

The intensity at P is $\frac{q}{\overline{OP}^2}$ and that at P_1 is $\frac{q}{\overline{OP_1}^2}$.

Since the distance between P and P_1 is small, the intensity at all points between P and P_1 may be taken as the geometrical mean between the values at P and P_1 or $\frac{q}{OP \times OP_1}$. The work done when the unit charge passes from P to P_1 is the product of the mean force into the space, which is $\frac{q}{OP \times OP_1} \times PP_1$

$$= \frac{q}{OP \times OP_1}(OP - OP)$$

$$\frac{q}{OP} - \frac{q}{OP_1}.$$

The work done in passing from P to P_2 and P_2 to P_3 is

$$\frac{q}{OP_1} - \frac{q}{OP_2}$$

and $$\frac{q}{OP_2} - \frac{q}{OP_3}$$

The sum of these is $\frac{q}{OP} - \frac{q}{OP_3}$; which is, by definition, the difference of potential between the two points P and P_3, which are at a finite distance apart. If the second point be taken at an infinite distance from P, $\frac{q}{OP_3}$ becomes equal to o; hence the potential at the point P is $\frac{q}{OP}$.

§ 28. Potential of a Charged Conductor. Since the surface of a charged conductor is an equipotential surface, the potential at any point in the surface is usually spoken of as the *potential of the conductor*. In the case of a sphere uniformly charged, since the charge may be considered as concentrated at its center, the potential at the surface becomes $\frac{Q}{R}$, where Q is the total quantity of electrification on the sphere and R its radius. Or we may consider the charge Q as made up of a number of very small charges, q, evenly distributed over the surface of the sphere; then the potential at the center due to each of these elementary charges, q, is $\frac{q}{R}$. The total potential at the center will then be $\frac{1}{R}\Sigma q = \frac{Q}{R}$, where Σ denotes that the quantities, q, are all to be added. Since the potential is constant for all points inside the sphere, the value at the center must be also that at the surface.

§ 29. Energy Expended in Charging a Conductor. If a charge, Q, is brought from a great distance, or from the earth, which is at zero potential, to a conductor having a potential V, the work done is QV, but in charging a conductor the potential is zero at the beginning of the process and V at the end. The mean potential is $\frac{1}{2}$V, and the work done is therefore $W = \frac{1}{2}QV$.

§ 30. Capacity of a Conductor. The capacity of a conductor is numerically equal to the charge which must be given to it in order to raise its potential from zero to unity.

Whenever the term *capacity of a conductor* is used, it is understood to be at a great distance from other conductors, as its capacity is affected by the presence of conductors in the neighborhood.

§ 31. Capacity of a Sphere. Let R be the radius of a sphere, Q its charge, and V its potential. The potential V at the surface of the sphere has been shown to be (§ 28) $V = \frac{q}{R}$; hence if V is equal to unity, R = q = C, by definition, or the capacity of a sphere is numerically equal to its radius.

A conductor that requires one unit of electrification to raise its potential from zero to one would be said to have unit-capacity. A sphere of unit radius would evidently possess unit capacity. A sphere of n centimeters radius would require n units of electrification in order to raise its potential by unity. It is very difficult to calculate the capacity of conductors, other than the most simple forms.

§ 32. Capacity of Two Concentric Spheres. Let S and S′ (Fig. 23) be two concentric spheres with radii R and R′. The outer sphere, S′, is connected to earth, while the inner one, S, is maintained at a constant potential.

Let q be the charge on the inner sphere, and —q the equal and opposite charge on the inner surface of the outer sphere; that is to say, the two equal and opposite charges of which every charge is composed are now brought close together, and the field between them confined to the space between the two spheres. Since the field is confined to the space between the two spheres, the only work that can be done by moving unit-charge about in the field is that done in carrying unit-charge from the inner sphere, S, to the outer one, S′, and this work must be due to the charge q on the inner sphere, since the electric intensity at any point inside the outer sphere due to the charge —q is o. Furthermore, the charge on the inner sphere may be considered as concentrated at its center; therefore the work done is the difference in potential between the two points, distant R and R′ from the center, O, which is equal to $\frac{q}{R} - \frac{q}{R'} = V$; then $q = \frac{RR'}{R'-R}.V$.

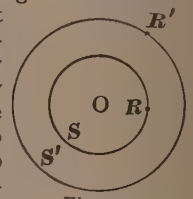


Fig. 23.

If V is made unity, $\frac{RR'}{R'-R}$ is, by definition, the ca-

pacity of the two spheres. When R is nearly equal to R′ it will be noticed that the quantity $\frac{RR'}{R'-R}$ becomes very large; hence such an arrangement is usually called a condenser.

If we suppose the outer sphere to consist of two hollow hemispheres, and that they are separated and removed to an infinite distance with their negative charge, the charge on S must remain $q = \frac{RR'}{R'-R}V$. Dividing the equation by R, we have $\frac{q}{R} = \frac{R'}{R'-R}V$. Now, $\frac{q}{R}$ is the value of the potential of the inner sphere when alone; i.e., when the opposite charge is at an infinite distance. Hence the removal of the opposite charge to an infinite distance has raised the potential from V to $\frac{R'}{R'-R}V$, which is large if (R′ — R) is small. This affords a beautiful illustration of the fact that potential, after all, is due to electrical separation, and that the charged condenser may be taken as a type of all charges; namely, two equal and opposite charges separated by a dielectric in a state of stress.

Small differences of potential may be magnified in this way: For example, the potential difference between the terminals of a battery-cell is small, but if the two terminals be connected with two plates which are close together, the plates become charged and have the same difference of potential as the cell; but if the connection be broken, and one of the plates removed, the potential of the other becomes greatly increased. Volta made use of this principle to increase the potential difference due to a cell, in order that he might observe it by instruments which were only suited for higher potentials.

§ 33. Case of Two Parallel Plates. Let the plates be very large, as compared with the distance between them. In this case the field of force between the plates is uniform, and the electric intensity is at right angles to the plate (§ 21). Let f be the intensity of the field between the plates. Then the work done when unit-charge passes from one plate to the other is ft, where t is the distance between the plates; hence $V = ft$. Let δ be the surface density on one plate and $-\delta$ that on the other. Then by Coulomb's law, $f = 4\pi\delta$; therefore $V = 4\pi\delta t$ and $\delta = \frac{V}{4\pi t}$. If V is equal to unity, δ, the quantity of electrification on unit-area, becomes numerically equal to the capacity per unit-area. For an area, A, the capacity is $\frac{A}{4\pi t}$.

Fig. 24.

§ 34. Condensers. The most common form of condenser is the Leyden jar, shown in Fig. 24. It consists of a glass jar coated inside and out to one half or two thirds its height with a conductor, usually tinfoil. It is charged by connecting the inner coating to any source of electrification by means of the knob and chain which are in electrical connection with the inner coating. The outer coating is connected with the earth by being held in the hand while charging, or with a metal conductor.

If A is the area of the tinfoil, t the thickness of the glass, the capacity of the condenser (air as a dielectric) would be approximately that of two parallel plates (§ 33) having the same area, or $\frac{A}{4\pi t}$; but as glass is used, the formula must be changed to $K\frac{A}{4\pi t}$, in which K is a factor depending on the nature of the dielectric. (See § 36.) Condensers to be used as standards of capacity and for purposes of measurement are made from a large number of sheets of tinfoil built up with mica or paraffined paper between each sheet. The alternate sheets are connected together at each end, thus forming practically two large sheets of tinfoil separated from each other by a thin layer of dielectric.

§ 35. Condensers in Parallel and Series. If several condensers, as, for example, Leyden jars, have their inside coatings connected by one wire and the outside coatings by another, they are said to be connected up in parallel. (See Fig. 25.) The result is one condenser with plates equal in size to the sum of the plate-areas of the several jars. Hence the capacity of the new arrangement is the sum of the several capacities.

Fig. 25.

If the several condensers be connected, as shown in Fig. 26, they are said to be connected in series, or cascade. The condensers are insulated, and the outside of one connected with the inside of the next, etc. Since the condensers are equal and insulated, the charge on the outside of the first is equal and opposite in sign to that on the inside of the next, and so on; the charges on the jars are equal. Let the capacities of the condensers be C_1, C_2, C_3, etc., Q is the charge on any jar, and let the potentials be V_1, V_2, V_3, etc.; then $V_1 = \frac{Q}{C_1}$, $V_2 = \frac{Q}{C_2}$, $V_3 = \frac{Q}{C_3}$. The difference of potential between the inside of the first and the outside of the last jar is

Fig. 26.

$$V = V_1 + V_2 + V_3 \cdots$$
$$= Q\left(\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots\right)$$
$$Q = \frac{V}{\frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots}$$

Let C be the capacity of the compound condenser; then $Q = CV$; hence $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots$

Therefore the capacity of the compound con-

denser is less than that of any of its constituents.

§ 36. Specific Inductive Capacity. Since the medium between the two charges of a condenser is in a state of stress, it is quite natural to suppose that the capacity of the condenser depends upon the nature of the medium between the plates. Faraday was the first to show that the medium held such an important part in all cases of electric charge; he took two condensers exactly alike as to their conducting surfaces, but so arranged that he could change the dielectric medium in one of them. When air was the dielectric, the two condensers had the same capacity; for when he charged one of them and connected it in parallel with the others, they were found to have the same charge; that is, the original charge was divided equally between them. But when sulphur was substituted for the air in one of the condensers, and both were connected as before, he found that the charge in the one with the sulphur was three or four times that in the one having air as the dielectric. This property of the dielectric is called its *specific inductive capacity*, or the *dielectric constant;* and the value of the specific inductive capacity of any dielectric is the ratio of the capacity of a condenser when this substance is used as the dielectric to the capacity of the same condenser when air is used.

It was the discovery of this property of the dielectric that led Faraday to the belief that the action of one electrified body on another is due, not to action at a distance, but to the dielectric between them. The importance of this discovery cannot be overestimated, as it furnished us with the only reasonable explanation to many, if not all, electrical phenomena.

Fig. 27 shows the effect of introducing a sphere of paraffine into an electric field in which air is

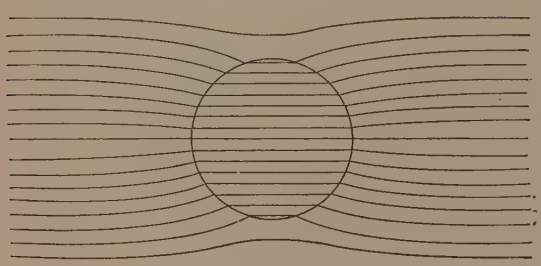


Fig. 27.

the medium. The paraffine, having a greater specific inductive capacity, causes the lines of force to concentrate through it. A *conducting* substance has infinitely great specific inductive capacity.

The table given below contains the value of the specific inductive capacities of the substances commonly used as dielectrics, air being taken as unity:

Solid paraffine	2.29	Flint glass	6.72
Paraffine oil	1.92	Dense flint glass	7.37
Ebonite	3.15	Turpentine	2.23
Sulphur	3.97	Distilled water	76.00
Mica	6.64	Alcohol	26.00

It has been found that if the field is rapidly changing, the specific inductive capacity is smaller. Take, for example, the case of a condenser, the charge of which is made to rapidly vary in potential from V to —V; the specific inductive capacity of the dielectric is less than when the change takes place slowly.

A few values of the specific inductive capacity for rapidly alternating fields are given below:

Ebonite	2.284	Shellac	2.747
Paraffine, solid	1.994	Glass (plate)	5.86

The specific inductive capacity of gases varies with the pressure, the difference between its value, for any gas, and unity being directly proportional to the pressure, except for very low pressure.

The values given below are taken at atmospheric pressure; that of air at the same pressure is taken as unity:

Hydrogen	.99967	Carbonic oxide	1.0001
Carbonic acid	1.00035	Olefiant gas	1.00072

§ 37. Effect of the Dielectric on the Intensity of the Field. Take the case of two parallel plate-condensers, A and B (Fig. 28), alike in all respects except

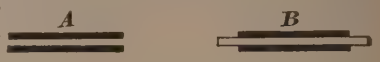


Fig. 28.

the dielectric, which is air for the condenser, A, and a substance of specific inductive capacity, K, is between the plates of B. Let the charge per unit-area in the two condensers be the same; then, since the capacity of B is K times that of A, the potential difference between the plates of B is only $\frac{1}{K}$ of that of A. But in both condensers the field of force between the plates is uniform, and is the rate at which the potential varies per unit-length. Since the distance between the plates is the same for each, the electric intensity between the plates of A is to that between the plates of B as the difference of potential between the plates of A is to that of B; that is to say, the electric intensity in A is K times that in B.

The electric intensity between two parallel plates in air is (§ 33) $f = 4\pi\delta$. Hence for a medium whose specific inductive capacity is K, we have $f = \frac{4\pi\delta}{K}$, which is Coulomb's equation generalized to apply in the case of any dielectric.

II. Current Electricity.

§ 38. Electric Currents. If in § 14 the two bodies could be charged as fast as the discharge takes place through the conducting-wire, there would be in the wire a steady flow of electricity. The wire and dielectric is essentially a charged conductor, with this exception. In the case of a charged conductor the potential is the same at all points of the surface, while the potential at the surface of the wire bearing the current gradually falls from V to —V. Furthermore, in order to keep up the conditions that we have supposed, it would be necessary to continually supply A with electricity from somewhere, which

would cause a deficit at the place from which it is taken and an accumulation at some other place. It is evident that this could not go on indefinitely, for the accumulated quantity would eventually overcome all obstacles and find its way to the place of deficit. Hence it follows that, in order to maintain a continuous current of electricity, it is necessary to provide, first, a continuous difference of potential, and second, a closed conducting-circuit. The first condition we may obtain by any of the several ways of producing electrification; as, for example, contact, induction, chemical action or electromagnetic induction, and the second by making the circuit continuous and of a conducting material. As there are no perfect conductors, any substance we may use will oppose, to a more or less extent, the flow of electricity along it, or, what is the same thing, will require the expenditure of energy in order to maintain a current, and the electrical energy which disappears appears as heat.

To sum up, we have the following quantities ever present in the case of continuous electric current, connected with each other by simple laws, which are of the utmost importance:

1. The continuous difference of potential or electromotive force.

2. The resistance of the closed conducting circuit, or that of any one of its parts.

3. The strength of the current which is produced.

4. The energy expended in the circuit, or any of its parts.

5. The field of force about the wire.

§ 39. Continuous Potential Difference. Take the case of a simple voltaic cell, as shown in Fig. 29, consisting of two conducting-plates immersed in an acid which acts upon one or both of them. Suppose that the wire, R, is not present, the plates A and B become charged either by contact with the acid or by the conversion of chemical energy into electrical energy, or both. Each plate in contact with the acid is charged to a definite potential, depending upon the material of the plate and the liquid. (See Primary Cells, in these Supplements.) In this case the zinc is charged to a higher potential than the copper. If, now, the plates be connected by the wire, R, we have but to consider two plates, as the charged bodies A and B of Fig. 10; the liquid corresponds to the connecting wire in the same figure, and the wire, R, is the return-path, the whole making up a complete circuit, which may be taken as a typical circuit. The liquid is necessarily a conductor, and conducts in a manner peculiar to liquids; it is called an *electrolyte*. (See Electrolysis, in these Supplements.)

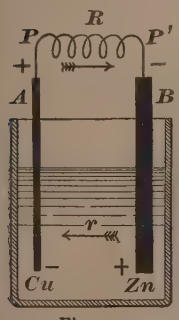


Fig. 29.

§ 40. Electromotive Force. The work done by the electric forces when unit-charge is propelled from P to P′ is called the electromotive force between the points, and briefly written E.M.F. The work done when the unit-charge is carried completely around the circuit is called the electromotive force of the cell, and is equal to the difference of potential between the plates before the wire, R, was added.

§ 41. Strength of Current. If the difference of potential of the plates (Fig. 29) is kept constant, the current through the wire, R, is constant, provided the resistance of the wire does not change. Furthermore, the quantity of electricity that passes through any cross-section of the circuit in the same time, as P for example, must be constant; if not, there would be an accumulation of electricity at some point in the circuit. The quantity that passes any section in unit time is called the intensity of the current.

§ 42. Relation between E.M.F., Intensity of Current and Resistance. Let E be the electromotive force between the points P and P′ (Fig. 29), I the strength of current and R the resistance of the conductor between P and P′. The relation between these three quantities is given by the expression $I = \frac{E}{R}$, which is known as Ohm's law.

§ 43. Energy Expended by the Current in Overcoming Resistance. As before, let E be the electromotive force between P and P′ (Fig. 29), I the intensity of current, and R the resistance of the wire between these points. By definition, E is the work done on unit-charge in carrying it from P to P′; and as I is the number of units passing between the points in unit-time, EI is the total work done between these points. From Ohm's law, $E = RI$; hence the work per second is $EI = RI^2$. This energy, which disappears as electrical energy, appears as heat, which, in most cases, is a loss; but whenever it is desired to produce light or heat by means of the current, this forms the useful part of the energy.

The product, $EI = I^2R$, is a number of work-units; hence if the heat generated is measured, we obtain a value of the mechanical equivalent of heat; for, by the principle of conservation of energy, the amount of energy that appears in the form of heat must be equal to that which disappeared as electrical energy.

§ 44. Conductivity. If R is the resistance of a conducting wire, then $\frac{1}{R}$ is defined as its conductivity.

It is often necessary to refer to the resistance and conductivity of a *substance*, rather than a definite portion of it. The resistance of a *substance* is termed its *specific resistance*, and is defined as the resistance of a conductor of the material having unit-length and unit cross-section; i.e., a unit cube. The conductivity is the reciprocal of the specific resistance.

The following table gives the specific resistance and relative conductivity of the more common substances; also the resistance of a wire or column of the substance one meter long and one square millimeter in cross-section.

TABLE OF SPECIFIC RESISTANCES.

Substance.	Specific Resistance *(microhms of 1 c.m.cube)	Resistance (ohms) of meter-length, 1 sq. mm. Section.	†Relative Conductivity.
Metals at 0° C.			
Copper (annealed)	1.570	.0157	100.
Copper (hard)	1.603	.0160	98.1
Silver (annealed)	1.492	.0149	105.
Silver (hard)	1.620	.0162	98.
Gold	2.077	.0208	76.
Aluminium (annealed)	2.889	.0289	54.
Platinum	8.982	.0898	17.
Iron (pure)	9.638	.0964	16.
Iron (telegraph wire)	15.	.15	10.
Lead	19.63	.1963	8.3
Mercury	94.34	.9434	1.6
Selenium	6×10^{10}		$\frac{1}{40000000000}$
Carbon (graphite)	2,400 to 42,000		
Carbon (arc light)	About 4,000		$\frac{1}{2500}$
Alloys.			
German silver (Cu60, Zn26, Ni14)	20.76	.2076	7.6
Platinum silver (Pt67, Ag33.)	2.4	.024	6.5
Platinoid (Cu59, Zn25.5, Ni14, W55)	32.5	.325	4.8
Manganin (Cu84, Ni12, Mn3.5)	47.5	.475	3.3
Liquids at 18° C.			
Pure water	26.5×10^8		Less than one millionth part.
Dilute H_2SO_4, 5%	486×10^4		
Dilute H_2SO_4, 30%	137×10^4		
Dilute H_2SO_4, 80%	918×10^4		
Dilute $ZnSO_4$, 24%	214×10^5		
Dilute HNO_3, 30%	129×10^4		
Insulators.			
Glass at 20° C.	91×10^{18}		
Glass at 200° C.	22.7×10^{12}		Less than one billionth.
Gutta percha, 24° C.	4.5×10^{20}		

* A microhm = one millionth of an ohm.
† Copper is taken as 100.

§ 45. Resistance of Conductors in Series. AB, BC and CD are three or more conducting-

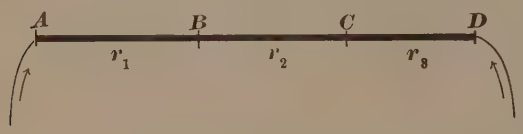


Fig. 30.

wires (Fig. 30) connected end to end, or in series, and forming a part of an electric circuit. Let r_1, r_2 and r_3 be the three resistances, and V_A, V_B, V_C and V_D be the potentials at the points A, B, C and D; then, since the current i is everywhere the same, we have, by Ohm's law,

$$V_A - V_B = r_1 i$$
$$V_B - V_C = r_2 i$$
$$V_C - V_D = r_3 i$$

Adding the three equations, we get

$$V_A - V_D = (r_1 + r_2 + r_3) i.$$

Let R be the resistance between A and D; then, by Ohm's law, $V_A - V_D = Ri$, or $R = r_1 + r_2 + r_3$. Hence the resistance of two or more conductors, placed in series, is the sum of the several resistances.

§ 46. Resistance of Conductors Placed in Parallel. Let r_1, r_2 and r_3 (Fig. 31) be the resistance of the three conductors connecting A and B. Let R be the resistance of a single conductor, which, if introduced between A and B, instead of r_1, r_2 and r_3, would offer the same resistance as the three wires when placed side by side, or in parallel.

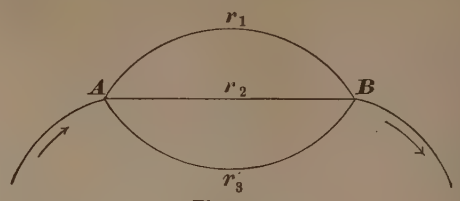


Fig. 31.

Since the current flowing would be the same for the single wire, or the three in parallel, the conductivity of the single wire must be the same as the single conductor which can replace them; hence $\frac{1}{R} = \frac{1}{r_1} + \frac{1}{r_2} + \frac{1}{r_3}$.

§ 47. Field of Force about a Conductor in Which a Current Is Flowing. Let A and B (Fig.

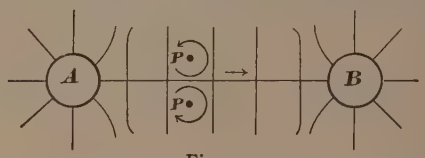


Fig. 32.

32) be two positively charged conductors connected by a wire. The surface of the conductors and the wire forms an equipotential surface, the electric intensity at all points on the surface being normal to the surface, as shown in Fig. 32. Suppose that a part of the electrification on B should be instantly removed or neutralized, the potential of B is lowered and the surface of the system is not an equipotential surface. The electricity on A moves toward B until equilibrium is again established and the surface is once more an equipotential surface. During the movement of electricity we can picture the lines of force as moving along the wire, but remaining perpendicular to its surface. This onward movement of the stress represented by the movement of lines of force gives to the field of force about the wire entirely new properties. Consider a small amount of electricity in the dielectric at P. We can readily picture the small quantity of electricity as being thrown into a state of rotation by the onward movement of the lines of force; the electricity at all points equally distant from P, and in a plane perpendicular to the wire, would be in the same condition; this would give rise to circular filaments of whirls about the wire, each one of which might be represented by an ordinary smoke-ring; this condition of the field would last as long as electricity flows from A to B, or as long as it carries a current. Whether this be true or not, the field about a wire bearing a current possesses the property of acting upon magnets, and therefore it is called an *electromagnetic field* of force. This field of force is exactly the same as that about a magnet. If a sheet of paper be pierced with a hole in the center, and a conductor passed through the hole, as in Fig. 33, the field of force about the wire, when it carries a current, may be mapped out by fine wire-iron fil-

ings sprinkled on the paper. When the paper is gently tapped, the filings, which may be considered as small magnets, arrange themselves in circles, concentric with the wire. A magnet-pole placed at P (Fig. 33) would be moved around the circle through P in a direction depending on the kind of pole and the direction of the current.

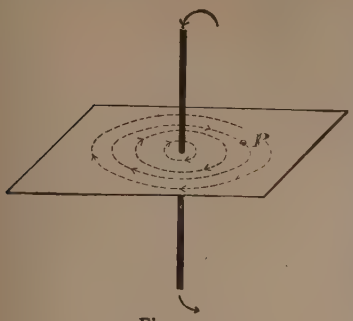


Fig. 33.

§ 47a. Directions and Intensity of the Electromagnetic Field. The direction of the force at any point in an electro-magnetic field is defined as the direction in which a north-seeking magnet-pole tends to move when placed at that point. The direction of the force can readily be found when the direction of the current is known, by remembering the following simple analogy: Suppose an ordinary watch to be pierced by a hole through its center, and perpendicular to its face; imagine the wire to pass through this hole so that the current will enter the face of the watch, and leave at the back. The direction in which the north-seeking pole would move around the wire is the same as that in which the hands of the watch move.

The intensity of the electro-magnetic field at any point is defined as the force in dynes exerted upon unit positive pole when placed at the point. Unit pole is a small magnet-pole of such a strength that it will repel a like pole with unit force (one dyne) when placed at unit distance (1 c.m.) from it.

§ 48. Representation of the Electromagnetic Field by Lines of Force. Fig. 34 shows

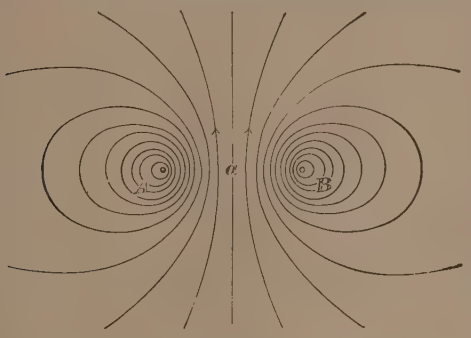


Fig. 34.

the lines of force in the field about a circular ring bearing a current. The plane of the paper is perpendicular to the plane of the ring, and passes through its center; the current passes down at A and up at B.

§ 49. Intensity of the Field at the Center of a Circle. The intensity of the magnetic field at any point is directly proportional to the strength of the current producing the field, and the length of the conductor, if very short as compared with the distance of the point from the conductor, and inversely proportional to the square of the distance of the element of current from the point.

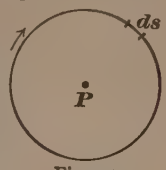


Fig. 35.

In Fig. 35 let I be the intensity of current flowing in the circle, and P a point at the center; ds is a small length of the conductor, and d its distance from the point. Then the intensity of the magnetic field at P is $f = \frac{KIds}{d^2}$ where K is a constant depending upon the unit current used. If P is at the center of the circle, the intensity at this point will be

$$f = \frac{KI\Sigma ds}{r^2}$$

$$\Sigma ds = 2\pi r$$

$$\text{hence} \qquad f = \frac{KI \cdot 2\pi r}{r^2} = \frac{KI \cdot 2\pi}{r}$$

If the current be defined as in the next article, K is unity, and $f = \frac{2\pi I}{r}$.

§ 50. Unit Current. The magnetic field about a conductor in which a current is flowing enables us to select a definite current to use as a unit or standard current.

If the conductor, Fig. 35, is a circle of unit-radius, and the current flowing is such that each unit length of the conductor exerts unit force on unit magnet-pole placed at the center, the current is said to be of unit strength. If the force at the center due to unit length of the conductor is unity, that due to the whole circumference is 2π. If the current is not unity, but I, and the radius, any radius, r, the electromagnetic intensity at the center is $f = \frac{2\pi rI}{r^2}$ or $\frac{2\pi I}{r}$. Hence K in the preceding article is unity, if the above unit of current is chosen.

§ 51. Galvanometers. The action of the electromagnetic field upon a magnet, or the mutual action between two such fields, serve as a basis for current measurement.

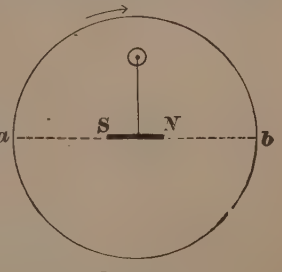


Fig. 36.

Let *ab* (Fig. 36) be a circle bearing a current I; SN is a small magnet suspended at the center of the circle, and short as compared with the diameter of the circle. Imagine the plane of the circle as vertical and placed to coincide with the vertical plane through the magnet when there is no current through the circle, or coil as it is usually called.

The magnet is suspended from the point O by a light fiber which is without torsion as nearly as possible, and hangs nearly north and south when

there is no force acting on it, other than that due to the earth's magnetism. If a current is sent through the wire from south to north along the upper side of the coil, the north pole of the needle will be urged to the west and the south pole to the east.

Let NS (Fig. 37) be the position of the needle before deflection and N′S′ that after. The intensity of the magnetic field at any point due to the earth's magnetism is expressed in the same manner as the field due to a current; i.e., by the force exerted upon unit-pole placed at the point. Furthermore, it is only that component of the earth's field lying in the horizontal plane which can act to bring the needle back to its initial position when deflected. If the pole-strength of the needle is not unity, but m, then the force acting on each pole of the needle is Hm when H is the horizontal component of the magnetic field at the point before the current flows in the coil. The force f, due to the current, is practically perpendicular to the plane of the coil in the small region occupied by the magnet, and has for its value $f = \frac{2\pi m I}{r}$, where m is the pole-strength of the needle, I the current, and r the radius of the coil. Consider, first, the force Hm. It is evident that only that component of it perpendicular to the needle can rotate it about the point of suspension. The value of this component is $Hm \cos \alpha$. Similarly, only the component of the force f, which is perpendicular to the needle is to be taken into account; this component is $\frac{2\pi m I}{r} \cos \beta$; now, when the needle is acted upon by both forces, it will come to rest at the point where these components are equal; at this point we have $\frac{2\pi m I}{r} \cos \beta = Hm \cos \alpha$, but the angle α is equal to θ, the deflection, and β is the complement of θ; hence $\cos \alpha = \sin \theta$ and $\cos \beta = \cos \theta$; hence we may write, $\frac{2\pi m I}{r} \cos \theta = Hm \sin \theta$, or $I = H \frac{r}{2\pi} \tan \theta$. If the coil have n turns close together, and n is not large, then the value of the current is $I = H \frac{r}{2\pi n} \tan \theta$. It will be noticed that H is a force which can be measured, and is practically constant during any one measurement and the quantity $\frac{r}{2\pi n}$ is made up of constants; hence the current is proportional to the tangent of the angle of deflection, and the instrument is called a tangent galvanometer. Such an instrument is useful only to determine the absolute value of the current; i.e., measure it directly with the unit we have defined. The chief objection to its use is the variability of H. For practical purposes other forms are used, the principal types of which are,—

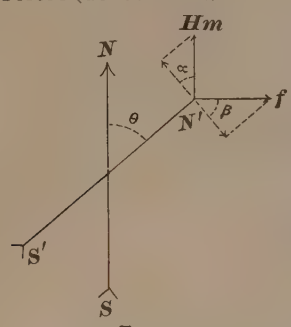


Fig. 37.

1. Galvanometers similar to the tangent galvanometer, in that they have a fixed coil and movable magnet.

2. Those in which the magnet is fixed in position, and the coil moves.

3. Electrodynamometers, instruments in which both fields are produced by the current, one of the coils being suspended or movable.

§ 52. Suspended-Needle Galvanometers. Fig. 38 shows the construction of an ordinary

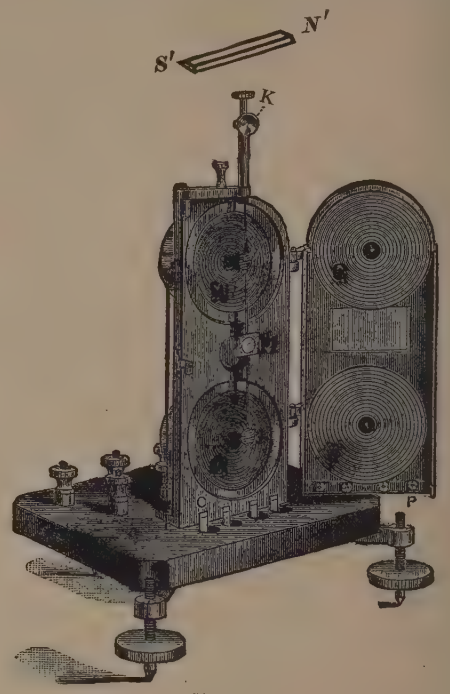


Fig. 38.

mirror or reflecting galvanometer. There are two small magnets, N and S, connected by a light aluminium rod, to the center of which is attached the mirror, M. The magnets, connecting-rod and mirror constitute the system, or suspension as it is sometimes called. Each of the magnets is built up of several small bits of magnetized steel wire, one fourth to three eighths of an inch long. The poles of the two magnets are reversed, as shown in the figure, and the upper magnet is the stronger; hence the force tending to set the system north and south is the difference between the strength of the two needles. If the needles were of the same strength, the system would remain in any position. Such a system is called an *astatic system*. N′S′ is a magnet placed on the case of the instrument, and above the system. (The case is not shown.) This magnet can be moved up and down, and rotated about a vertical axis. In the position shown, N′S′ creates a magnetic field at the upper needle which is opposite to that of the earth at the same point; hence if N′S′ is lowered to a certain point, it neutralizes the earth's field, and the system becomes as nearly

astatic as we choose to make it. In this condition the galvanometer is extremely sensitive, since the force opposing the rotation of the system is very small. It is evident that if the magnet N′S′ is reversed, the galvanometer becomes less sensitive, as then the earth's field is increased. N′S′ is called the control-magnet; if the system consisted of but one magnet, it would be controlled in the same manner. A, B, C and D are four coils connected in such a way, that when a current is sent through them each one deflects the system in the same direction. In the figure, C and D are thrown open to show the suspension. The system is suspended from K by a fine silk or quartz fiber with little torsion, and the deflections are read by a spot of light reflected from the mirror, M, to a scale, or with a telescope and scale.

§ 53. Suspended-Coil Galvanometers. Since the action of a current upon a magnet is mutual, it is immaterial which is fixed and which is movable, except from practical considerations.

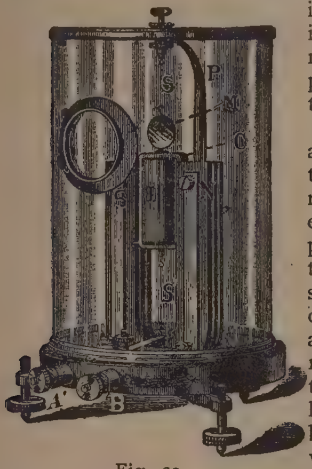


Fig. 39.

Fig. 39 represents a common form of this type. The current to be measured enters the binding, post A, passes under the base of the instrument to the foot of the post P, up P and down the fine metal wire, S, through the coil, C, and the lower wire, S′, to the binding-post, B. The wires, S and S′, are very fine, and their elasticity of torsion provides the force against which the coil acts when it rotates. N and S are the poles of a large magnet, between which the coil C is suspended. I is a soft iron core supported from behind. This is often omitted, and the coil made more narrow. The effect of the soft iron core is to strengthen the magnetic field in which the wires of the coil move. The deflection is read by means of the mirror, in connection with a lamp or telescope, and scale.

Instruments built upon this principle are known as D'Arsonval galvanometers; the advantage of this type over others is, that, having a strong magnetic field of its own, it can be used in any position, and is only slightly affected by the presence of magnetic material in its neighborhood. The suspending-wire must be strong enough to support the coil and large enough to carry the current, and though we make the wire as small as possible, it still has considerable torsion, as compared with the fine silk or quartz fibers used in the suspended-magnet instrument.

The well-known Weston ammeters and voltmeters are instruments of this type; the coil is supported on an axis which turns in jeweled bearings, and the current is led in and out of the coil by two coiled springs on the axis, like the hairspring of a watch. The springs also furnish the force against which the coil acts.

§ 54. Action of Currents upon Each Other. Let A (Fig. 40) represent a conductor and its magnetic field due to a current flowing in it. A line of magnetic force behaves as if it were a stretched spiral spring rotating about the axis of the spiral, and having its ends joined to form a closed curve about the conductor. A small portion of a line is represented in this manner, at B. Suppose the conductor, A, to be divided longitudinally into two parallel portions, and these separated as shown at C and D. Some of the lines nearest the conductor would part as C and D are separated, and form closed curves around the separate conductors. The other lines would remain as closed curves, somewhat elongated, but enveloping both conductors, and exerting a force tending to draw the wires together again. Since the current in the two portions is flowing in the same direction, it follows that *currents flowing in parallel conductors and in the same direction attract each other*. If the currents in parallel conductors flow in opposite directions, the lines, rotating, as it were, in opposite directions, cannot coalesce to form closed curves around both conductors, but are crowded between them, as at E and F, thus forcing the wires apart. Hence *parallel currents flowing in opposite directions repel each other*.

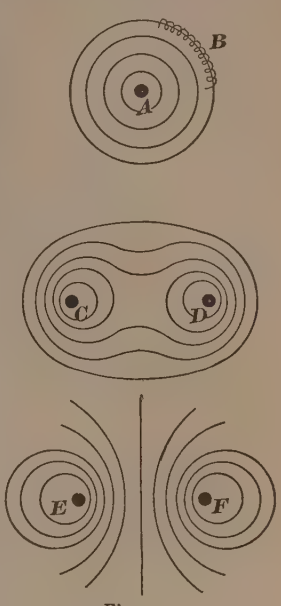


Fig. 40.

It can be shown that the force between parallel currents is directly proportional to the product of the current strength, to the length of the portions taken, and inversely proportional to the distance between them.

Instruments for measuring current-intensity which depend upon the mutual attraction or repulsion by currents are called electrodynamometers. Several forms have been devised, but those in common use consist either of a coil suspended in the field of another, or a coil so arranged that the force of attraction can be balanced directly against the force of gravity.

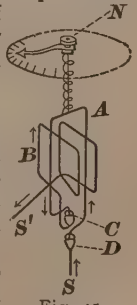


Fig. 41.

Fig. 41 illustrates those of the first class. The

current enters at S, passes throughthe coil, A, to the mercury-cup, C, thence through the coil, B, and out at S′.

When a current passes, the movable coil tends to rotate about a vertical axis, and set itself in the plane of the fixed coil, B. The head, N, is then turned until the coil is brought back to its initial position.

The force of torsion exerted by the spring is proportional to the angle moved through. Since the same current flows in each coil, doubling the current would make the attraction four times as great, etc. Hence the square of the current is proportional to the number of divisions moved through by the index in order to bring the coil back to zero. If I is the current and D the number of divisions, and A a constant depending on the winding of the coil and the helix, then $I^2 = A^2D$.

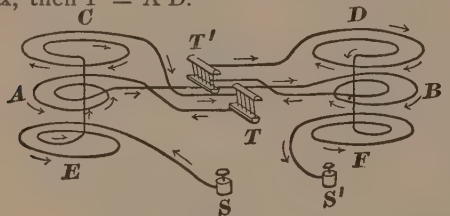


Fig. 42.

Fig. 42 represents the windings of an instrument in which the force between the currents acts against the force of gravity. The current enters at S, passes through the coil A, up to B, and through B in the reverse direction, and so on through the system, as indicated by the arrows. T and T′ are flexible conducting-suspensions; hence the coils A and B form a balance-beam supported at T and T′. When a current is sent through the system, the coils C, D, E and F all tend to turn the balance-beam in the same direction; this force is opposed by weights added to one end of the beam, or by a sliding counterpoise. The value of the current is found from the amount of weight required to restore equilibrium.

This form of the instrument is due to Lord Kelvin, and they are known as the *Kelvin current balances.*

III. Electromagnetism.

§ 55. Electromagnetic Intensity. We have seen that the intensity of the magnetic field

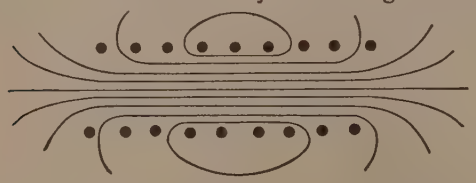


Fig. 43.

at the center of a circular current is $\frac{2\pi I}{r}$. If a number of these circles are placed side by side, as shown in section (Fig. 43), the lines of force will pass through them parallel to a line through the center of the circles. A wire wound in the form of a helix or solenoid, and carrying a current, would be practically the same thing. The magnetic field inside of a long solenoid is uniform, except at points near the ends, and its intensity can be shown mathematically to be $4\pi nI$, or $\frac{4\pi nI}{10}$, in case the current is measured in amperes, in which I is the strength of current and n the number of turns in the helix per unit of its length. This quantity is also called the magnetizing force of the helix, and is designated by the symbol **H**.

The intensity of the magnetizing force **H** is often expressed as the number of lines per unit of area at the point.

§ 56. Effect of Iron in the Field. If, instead of air, soft iron is placed in the helix, as shown in

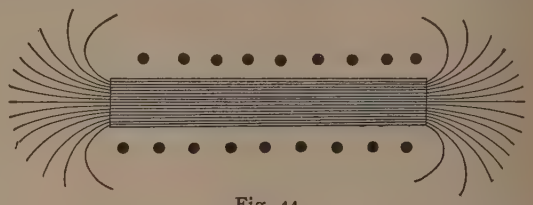


Fig. 44.

Fig. 44, it is found that a great many more lines are set up through the iron than in air; that is to say, iron is a more suitable medium for the formation of the magnetic lines of force than air. Other substances, such as cast-iron, steel and nickel, are more or less suitable for the medium, but pure iron excels all other substances. The number of lines per unit of area in the iron is called the induction, and is designated by **B.**

§ 57. Permeability. Since the capacity of substances for magnetic lines vary, it will be necessary to take some one substance as a standard and compare others with it; hence air is taken as this standard. This property of substance is termed *permeability* and is expressed by the character μ.

If **H** is the number of lines per unit area in air, and **B** the number per unit-area when iron is the medium, then $\mu = \frac{B}{H}$

Fig. 45 shows the effect of placing a sphere of iron in a uniform magnetic field. Since the iron has a greater permeability than air, the lines concentrate in the iron part of the field. If the substance placed in the field has a less permeability than air, the effect would be that shown in Fig. 46.

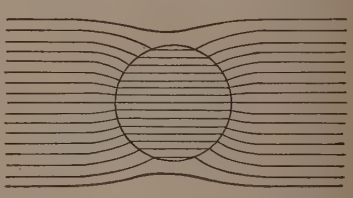


Fig. 45.

§ 58. Magnetic Susceptibility. The magnetic property of a substance is sometimes expressed in another way.

When iron is put in the helix (Fig. 44), it becomes a magnet, with north and south poles; the intensity of magnetization is the number of unit poles

per square unit of the polar surface. This intensity, or, what is the same thing, the pole-strength per square unit, is represented by **I**.

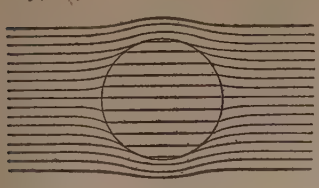


Fig. 46.

The ratio of the intensity of magnetization to that of the field producing it is called the susceptibility of the substance; it is denoted by the symbol k. Therefore, $k = \frac{\mathbf{I}}{\mathbf{H}}$.

§ 59. Relation between μ and k. A unit magnet-pole placed at the center of an imaginary sphere of unit radius would produce unit intensity of field at all points on the sphere. Since the surface of a sphere of unit radius is 4π, the total number of lines of force proceeding from any unit magnet-pole is equal to 4π.

Then if **I** is the number of unit poles per square unit of the face N (Fig. 47), $4\pi\mathbf{I}$ is the number of lines through the same area due to the polarity of the iron. The intensity of the field before the rod was inserted is **H**; hence the total number of lines per square unit, which has been called **B**, is also $(\mathbf{H} + 4\pi\mathbf{I})$. Hence $\mathbf{B} = \mathbf{H} + 4\pi\mathbf{I}$; dividing by **H** we get $\frac{\mathbf{B}}{\mathbf{H}} = 1 + 4\pi\frac{\mathbf{I}}{\mathbf{H}}$ or $\mu = 1 + 4\pi k$.

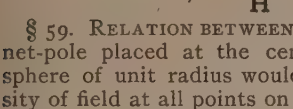


Fig. 47.

§ 60. Paramagnetic and Diamagnetic Substances. It has long been known that some substances, when suspended in the magnetic field, come to rest with their longest dimension at right angles to the field; such substances are called diamagnetic substances. Bismuth and many liquids are examples. Substances that behave like iron are called paramagnetic substances.

A clear conception of permeability enables one to understand this action. Let *mm* (Fig. 48) be a small bar of a substance having a permeability greater than air, and placed in the field between the two magnet-poles N and S. Since the permeability of the substance is greater than air, a line of force, as *ab*, will tend to take the path, having as much of the substance and as little air as possible, as shown in the upper sketch of the figure. But if the body *mm* is free to move, and rotates about its center, the lines will set themselves straight again and pull the body into the line *ab*.

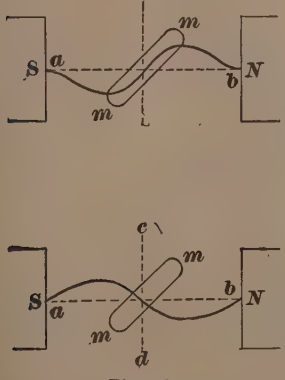


Fig. 48.

If, however, the substance has less permeability than air, a line, as *ab*, will set itself through more air and less substance; and, as before, if the body is free to rotate the lines, setting themselves straight will set the body along the line *cd*.

§ 61. Method of Representing Magnetic Properties. The relation of the magnetic force, **H**, to the induction, **B**, is best represented by a curve, as in Fig. 49. The substance in the form of a bar or ring forms the core of a helix of known length and windings. The current in the helix is given different values, and the magnetizing force, **H**, in each case is calculated by the formula given in § 55. The value of the induction, **B**, is measured for each value of **H**, and the result plotted in the form of a curve. If the induction, **B**, increased in direct proportion with the magnetizing force, **H**, the curve would become a straight line. It will be noticed that in the case of soft iron the curve rises rapidly, bends over, and then rises very slowly. Beyond the bend, the iron is said to be approaching saturation, and is saturated when an increase of **H** causes the same increase in **B**.

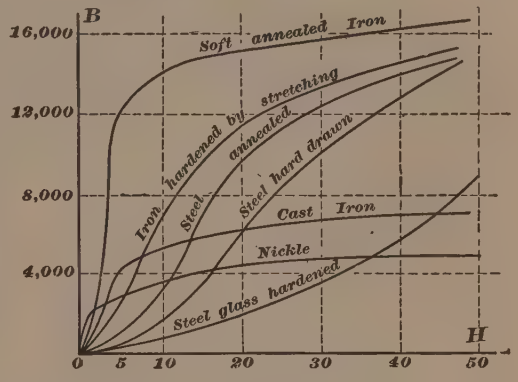


Fig. 49.

Hence we see that the effect of iron in the field is limited, and the permeability of a substance is not a constant, but depends upon the induction. At the point of saturation, **B** is equal to **H**, and the permeability is unity, or that of air.

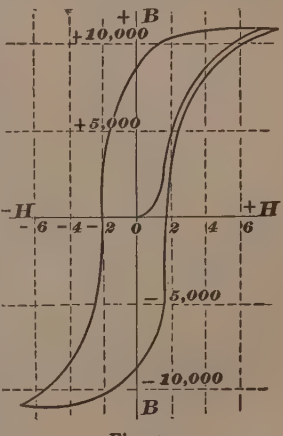


Fig. 50.

§ 62. Hysteresis. If, in the preceding article, **H** is increased step by step to a definite value, then decreased through o to an equal value in the other direction (the current is reversed at o), and then again increased to o, the curve will not be the same for the increasing values

of **H** as for the same values when **H** is decreasing. Fig. 50 shows such a curve. It will be seen that the induction lags behind the magnetizing force. For example, when **H** is increasing from its lowest value,—**H**, and reaches 0, the induction is not 0, but nearly —9000. This phenomenon is known as *magnetic hysteresis*. The area inclosed by the curve has been shown to represent the amount of heat generated during the cycle, which is lost as far as magnetic energy is concerned.

§ 63. The Magnetic Circuit. Since magnetic lines always exist as closed curves, their path is called the magnetic circuit. In Fig. 44 the magnetic circuit is through the iron inside of the helix and through air outside of it.

The magnetic circuit is unlike the electric circuit, in that the magnetic lines cannot be confined totally to any one circuit, since there is no material in which the magnetic lines cannot exist.

§ 64. Reluctance. The reluctance of a bar of magnetic substance is defined as the resistance it offers to the flow of magnetic lines. If l is the length of the bar, S its cross-section, and μ the permeability of the material, then the reluctance of the bar is $R = \frac{l}{\mu S}$. If l and S are unity, the reluctance becomes $\frac{1}{\mu}$, and this should be termed the *specific reluctance* of the material. The terms are used to express the property of magnetic resistance in exactly the same way that resistance and specific resistance are used to express electrical resistance.

§ 65. Magneto-Motive Force. The electromotive force in an electric circuit is the work done by the electric force in urging unit-quantity of electricity completely around that circuit.

Magneto-motive force is defined in the same manner; i.e., the work required to carry unit magnet-pole completely around the magnetic circuit. Inside the spiral of Fig. 43 the intensity is $4\pi nI$. The intensity outside is very small, so that the work done in carrying unit-pole around the circuit is the product of the force into the distance, which is equal to $4\pi nIL$, or $\frac{4\pi nIL}{10}$ in case amperes are used, in which L is the length of the spiral. Since nL is the total number of turns in the spiral, the above expressions may be written, $4\pi NI$ or $\frac{4\pi NI}{10}$, in which N is the total number of turns of wire.

The product, NI, is called the *ampere-turns* of the coil, when I is expressed in amperes.

§ 66. Law of the Magnetic Circuit. The law of the magnetic circuit is similar to Ohm's law for the electric circuit, and is written

$$\text{Magnetic flow} = \frac{\text{Magneto-motive force}}{\text{Reluctance}}$$

Let the poles of the electromagnet shown in Fig. 51 be connected by a bar of iron (called the armature), but separated from it by two air-gaps. The magnetic circuit then consists of three parts, —the core, the armature and the air-spaces. Let l_c, l_a and l_g be the length of core, armature and one air gap; S_c, S_a and S_g the cross-section of the same parts; μ_c and μ_a the permeability of core and armature (μ for the air-gaps is unity). Then the flow of magnetic lines is

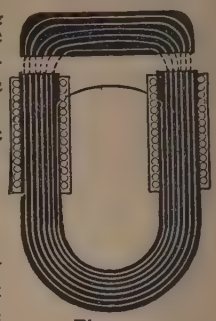


Fig. 51.

$$F = \left\{ \frac{4\pi NI}{\frac{l_c}{\mu_c S_c} + \frac{l_a}{\mu_a S_a} + \frac{2l_g}{S_g}} \right\}$$

To apply the law to any particular magnetic circuit it is necessary to know the curve of magnetization for the material used. Since μ is different for difference of F, this fact makes the formula somewhat difficult to apply.

§ 67. Poles of an Electromagnet. If, when looking directly at the pole of an electromagnet the current in the helix flows around it in the same direction as the motion of the hands of a watch, the pole is a south-seeking pole; if opposite, a north-seeking pole.

§ 68. Motion in an Electromagnetic System. If any part of an electromagnetic system is movable, as, for example, an armature, the motion will always be such as to reduce the reluctance of the circuit, and hence increase the flow of lines. When the armature approaches the poles the air-gaps become less, and more lines of force traverse the circuit. (See Fig. 48.)

IV. Electromagnetic Induction.

The production of a magnetic field by an electric current is one of the many reversible processes found in natural phenomena.

If a conductor forming a part of a circuit is brought into a magnetic field, an electric current is set up in the circuit and continues as long as the intensity of the field about the wire is changing. Strictly speaking, it is an electromotive force that is induced in the circuit, and a current flows as a result of the E.M.F.

Faraday, the discoverer of this principle, could scarcely have realized its importance, as all dynamo-electric machines, induction coils, transformers and the telephone are examples of its application.

The intensity of the field about the circuit may be changed in a number of ways; as, for example, by moving a magnet near the fixed circuit, or the opposite, i.e., moving the circuit with the magnet fixed; or the circuit may be near another circuit in which a current is started, stopped or varied in intensity.

§ 69. Direction of the Induced Electromotive Force. The direction of the induced E.M.F., and consequently that of the current, may be determined by the following rule:

An increase in the number of magnetic lines passing through a circuit produces an indirect E.M.F., while a decrease in the number of lines

produces a direct current. By direct or indirect is meant like or unlike in direction, compared with the current that produces the inducing field.

Fig. 52 represents a circuit, B, near the solenoid, A. Some of the magnetic lines due to the cur-

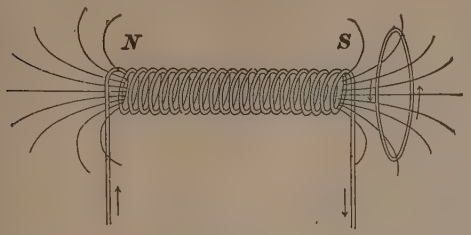


Fig. 52.

rent in A pass through the circuit B. If the current in A is increased, or the circuit brought closer to the solenoid, or a current started in the solenoid, the result in each case would be an increase of the number of lines threading through the circuit B; consequently the induced amount flows in the opposite direction to that in the solenoid. This result might have been predicted from the principle of the conservation of energy, for the three cases are equivalent to that of bringing the circuit B closer to A; in that case, if the currents were alike in direction, they would attract; hence no work would be required to bring them together, and a current would be produced without the expenditure of energy, which is impossible.

The same reasoning may be applied to the three reverse cases, which are equivalent to the separation of B from A, and produce the current which, acting upon the inducing current, resists the force producing the separation.

The solenoid of Fig. 52 may be replaced by a magnet, M, as shown in Fig. 53. The magnet

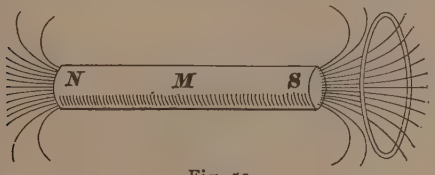


Fig. 53.

may be considered to replace the solenoid and current, which would give it the same polarity. Thus in the figure, the north pole of the magnet is toward the circuit, and the direction of a current in a solenoid which produces a north pole is opposite to the motion of the hands of a watch when viewed from a point facing the pole; therefore making the magnet stronger, bringing it nearer B, or making it a magnet would correspond to the first three cases of the solenoid, while if the magnet is made weaker, moved away, or has its magnetism destroyed, the induced current has the same direction as that in the imaginary solenoid.

§ 70. Value of the Induced Electromotive Force. *The value of the E.M.F. induced in any circuit is equal to the rate of change of the number of magnetic lines threading through the circuit.*

If dF is the increase in the number of lines during a small time, dt, then $E = -\frac{dF}{dt}$. The minus sign is given to the second member, since an increase in F induces a reverse E.M.F.

§ 71. Mutual Induction. When a current is sent through a circuit which is near another, as in A (Fig. 52), the number of lines of magnetic force common to the two circuits is called their *mutual induction.*

In the case of two circuits or coils fixed as to the number of windings, distance apart and character of the magnetic circuit, the mutual induction will depend upon the current flowing in the *primary*, as the inducing current is called. If, then, the current in the primary is made unity, the number of lines common to both circuits is called the *co-efficient of mutual induction*, and is usually denoted by M. P and S (Fig. 54) are two coils, P the primary and S the secondary. Let the coils have a common core, m, of iron, so that approximately all of the lines

Fig. 54.

of force set up by a current in the primary pass through the secondary. N_1 and N_2 are the number of turns in P and S respectively. Then by § 66 the magnetic flow through the primary is $F = \frac{4\pi N_1 I}{10R}$, where R is the reluctance of the iron core and I the current in amperes. But since there are N_2 turns in the secondary, and all of the lines pass through each turn, the secondary may be considered as composed of one turn, and the number of lines threading through it as $N_2F = \frac{4\pi N_1 N_2 I}{10R}$. If I is unity, $M = \frac{4\pi N_1 N_2}{10R}$. If the current in P varies at the rate $\frac{dI}{dt}$, the lines of force in S vary at the same rate, and the E.M.F. induced in the secondary S is $E_m = -M\frac{dI}{dt}$, where dI is the change in the current during a small time, dt.

For the unit of mutual induction, see Electromagnetic Units (§ 110).

§ 72. Self-Induction. When a circuit containing an E. M. F. is closed, the current does not reach its maximum value at once, but rises gradually to this value through a small time, depending upon the nature of the electric and magnetic circuit. The effect of closing the circuit is to introduce into the circuit its own growing magnetic field, which produces a reverse E.M.F., tending to retard the current. Similarly, when a circuit carrying a current is broken, its own field in dying out produces a direct E.M.F., tending to prolong the current. These effects are much more intense if the coil contains many turns, and the magnetic circuit is iron; for in that case the rate of change of the magnetic lines is greater.

Let the coil consist of N turns of wire, then the flow of lines due to a current, I, is $F = \frac{4\pi N^2 I}{10R}$. Since there are N turns in the coil, the effect is the same as if it had but one turn and N times the above number of lines were passed through it; hence, $NF = \frac{4\pi N^2 I}{10R}$. If the current turned on or off is one C.G.S. unit, the number of lines becomes $\frac{4\pi N^2}{R}$, which is called the *inductance, or co-efficient of self-induction* of the coil.

The value of the induced E.M.F. at a time, t, after the current has been made or broken depends upon the rate at which the current changes; but since the rate at which the current changes is not uniform, the induced E.M.F. is not uniform. If in a time, dt, which is small as compared with the time required for the current to reach its maximum value, the current changes by an amount, di, the rate at which the current is changing at the time t is $\frac{di}{dt}$, and the value of the self-induced E.M.F. at the time, t, is $-L\frac{di}{dt}$. For the unit of self-induction, see ELECTROMAGNETIC UNITS (§ 110).

§ 73. VALUE OF INDUCED CURRENT. If R is the resistance of a circuit having inductance, and i the value of the current at any time, t, after the circuit is closed, then from Ohm's law Ri is the value of the E.M.F. producing the current, and is equal to the impressed E.M.F., E, minus the reverse E.M.F., $L\frac{di}{dt}$, due to the inductance; hence $Ri = E - L\frac{di}{dt}$; for a given coil, L, is constant, and the equation solved gives the value of the current, $i = I(1-\varepsilon^{-\frac{Rt}{L}})$. Therefore, after a time, t, the current is less than its maximum value, I, by a quantity, $I\varepsilon^{-\frac{Rt}{L}}$. The quantity $\frac{L}{R}$ is called the *time constant* of the circuit, for when $t = \frac{L}{R}$, $\frac{Rt}{L}$ is equal to unity; then $1 - \varepsilon^{-\frac{Rt}{L}} = 1 - \varepsilon^{-x} = \frac{\varepsilon - 1}{\varepsilon}$. ε is the base of the Napierian system of logarithms, and has for its value 2.7183, which, substituted, gives 0.632 as the value of the current at the end of a time, $\frac{L}{R}$.

Several of the more important applications of electromagnetic induction are described in the following sections.

§ 74. INDUCTION-COILS. An induction-coil is an instrument for changing the energy of a current into that of another having a higher or lower E.M.F. It consists essentially of two coils having a common magnetic circuit. The coil into which the current is sent is called the primary, and that in which a current is induced, the secondary.

If the induction-coil is to produce a high E.M.F. from a current having a low E.M.F., the primary consists of a few turns of large wire, in order that the current through it may be heavy; the secondary is made up of many turns of fine wire, the ratio of the transformation being nearly the same as the ratio between the two windings.

In the ordinary Ruhmkorff induction-coil the secondary coil is wound outside of the primary,

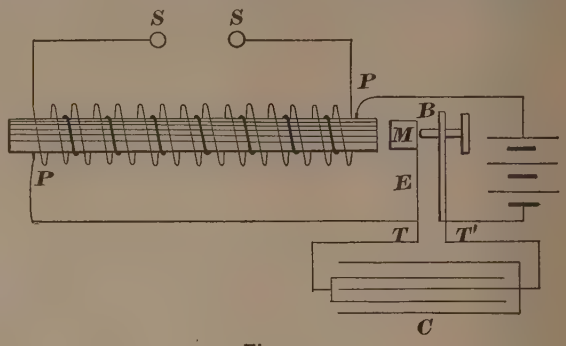


Fig. 55.

and both have the same iron core, consisting of a bundle of soft iron wires, as shown in Fig. 55, in order that a current made or broken in the primary may project the greatest possible number of lines through the secondary. Since the induced E.M.F. depends upon the change in the number of lines threading through the secondary, it is essential that the current in the primary be interrupted, or changed in value. Ordinarily, this is accomplished by means of an automatic circuit-breaker placed in circuit with the primary, as at B; when the primary circuit is closed, the core attracts the mass of iron, M, attached to the spring, E, thus breaking the circuit at B; the core, losing its magnetism, allows M to spring back, and the circuit is made again. Mechanical interrupters are also used.

The condenser, C, is connected with the points T and T'; when the primary circuit is broken, the inductance of the primary produces a direct E.M.F., which prevents the current from dying down immediately, and the current thus induced flows into and charges the condenser, C; but the condenser is free to discharge through the primary, and sends a current through it in the reverse direction, so that the flow of lines in the core is not only reduced to zero, but reversed, thus producing a more intense effect.

It has been shown that the condenser should be of such capacity that it absorbs a charge at a rate equal to the full delivery of the primary circuit during the time the circuit-breaker is opening to the maximum sparking-distance; the condenser then gives an equal reverse current through the primary, thus doubling the change in the magnetic flow, which doubles the induced E.M.F. The secondary is provided with two terminals, S and S', between which the discharge of the secondary takes place when the difference of potential reaches such a value that the air no longer insulates.

In large coils the secondary is wound in flat spirals, well insulated from each other, as the difference of potential between adjacent wires is then not as large as when the coil is wound in layers from end to end. The primary is insulated from the secondary by a glass or rubber tube, and the turns of the secondary well insulated from each other, by boiling in melted paraffine or wax.

Spottiswood constructed a coil, the secondary of which consisted of 280 miles of wire wound in 340,000 turns, and gave a discharge through 42½ inches of air.

A current which is rapidly alternating in direction may be used in the primary, but in that case the circuit-breaker is not used. (See § 76.)

§ 75. Tesla's Induction Coil. Since the discharge of a condenser is oscillatory (see § 92), the rapidly alternating current thus produced, when sent through the primary of a properly constructed induction-coil, induces E.M.F.'s of enormous values; the discharge under these conditions is extremely beautiful and interesting. (See § 94.)

While the above principle has long been known, we are indebted to Tesla for its successful application.

The electrical connections for securing the above conditions are shown in Fig. 56.

I is an ordinary Ruhmkorff induction-coil, the interrupter of which is not shown. The terminals

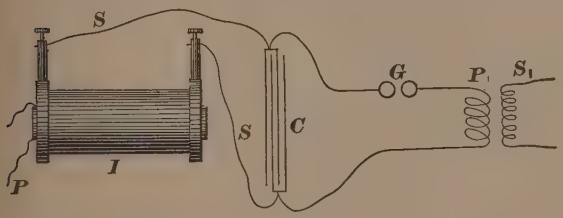


Fig. 56.

of the secondary SS are connected with the condenser, C; the terminals of the condenser are connected to the primary, P, of the *Tesla*, or *disruptive discharge coil* as it is often called. G is a spark-gap consisting of two polished metal balls a small distance apart. S_1 is the secondary of the Tesla coil. When the current in the primary, P, is broken a high E.M.F. is induced in the secondary S; this charges the condenser until the potential is sufficient to overcome the resistance of the gap, G. The air then breaks down, and the oscillatory discharge of the condenser takes place through the primary, P_1.

The construction of the Tesla coil is shown in Fig. 57. PP is the primary, wound oppositely, in two parts. In this particular coil each half of the primary is composed of four layers of twenty-four turns each, or ninety-six turns. The secondary, SS, is also in two parts of twenty-four layers, ten turns each, or 260 turns for each half. The two halves are wound oppositely and connected in series; the secondary is wound on two spools of hard rubber, RR, held apart by the hard rubber rods C. The primary is placed inside the secondary, and the terminals of both are brought to the top of the case through hard rubber tubes. The whole is then immersed in oil in a zinc-covered wooden box. The action of the coil depends largely upon the proper adjustment of the capacity, self-induction and resistance in the circuit.

§ 76. Transformer. A transformer is an induction-coil for the purpose of changing an alternating current, usually from a high to a low potential, though the reverse is sometimes the case.

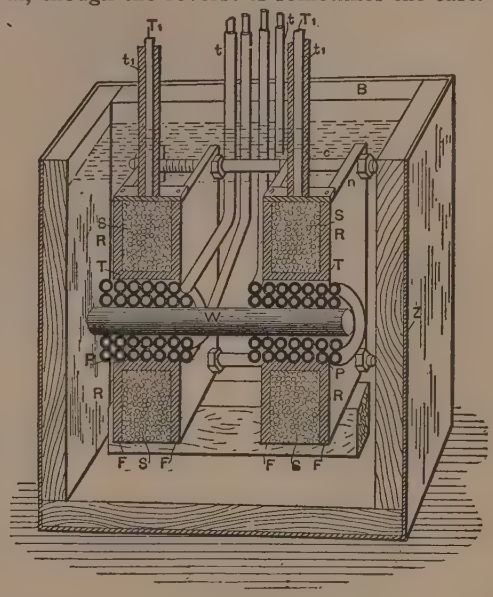


Fig. 57.

In the induction-coils previously described the object has been to transform a low to a high potential.

Faraday's ring (Fig. 54) is the earliest and the type of all transformers, and the electromotive force generated in the secondary circuit is to that employed in the primary very nearly as the relative number of turns in the two coils; if the primary has fewer turns than the secondary, it is called a "step-up" transformer, and a "step-down" transformer when the primary has the greater number of turns.

Fig. 58.

Fig. 58 shows the coils and magnetic circuit of one of the many commercial types of transformers. It will be noticed that the magnetic circuit is entirely of iron, the iron being built up of thin sheets separated by varnish or simply the oxide on the plates, in order that there may be no electric currents set up by induction in the iron core. The direction of the plate is arranged perpendicular to that in

which the induced current would flow. The coils are placed inside of an iron box, which is then filled with oil, to further insulate the coils from each other.

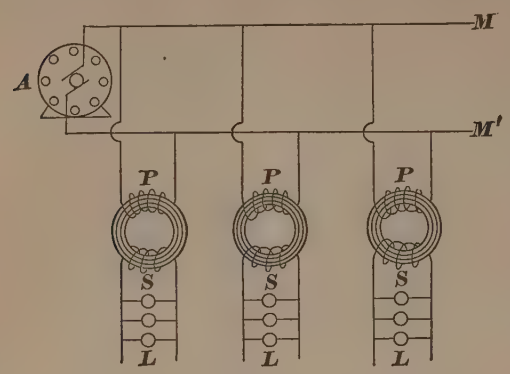


Fig. 59.

Fig. 59 shows the method of arranging transformers. M and M′ are the high potential mains leading from an alternating-current dynamo, A. The primaries, P, are connected in parallel to the mains. The incandescent lamps, L, are placed in the secondaries, S.

The regulation of a transformer is an interesting case of self and mutual induction. The primary remains in connection with the mains, yet very little current flows through it unless the secondary is closed; furthermore, the current supplied by the secondary is the correct amount needed for the number of lamps turned on.

Consider one of the transformers represented in Fig. 59, and let the secondary circuit be open; the reverse E.M.F. in P due to its self-induction almost equals the E.M.F. supplied; hence but little current flows through P. If, now, the secondary be closed, with, say, one lamp in circuit, there will be mutual induction, and this acts in opposition to the self-induction in the primary; thus more of the E.M.F. impressed upon the primary from the mains is allowed to act; or in other words, the mutual induction due to a current in the secondary opposes the self-induction of the primary almost in proportion to the current flowing in the secondary.

If more lamps are turned on, the current in the primary regulates itself to suit the load.

The rate at which electrical energy is transformed into heat in a conductor is I^2R (§ 43); therefore, if the current is doubled, the loss in the conductor is four times as great, or varies as to the square of the current. Since the energy of a current is also IV, or the strength of current times the fall of potential, the factors I and V may be varied, and the energy transmitted remain the same. For example, if I is five amperes, and V 1,000 volts, the rate at which energy is transmitted is 5,000 watts; also, if I is ten amperes, and V 500 volts, the energy rate is 5,000. Now, if this energy is to be transmitted to a distance, through a conductor having a resistance of 2 ohms, the loss in the conductor would be, for the first case $(5)^2 \times 2 = 50$ watts; while in the second case it would be $(10)^2 \times 2 = 200$; therefore it would be more economical to use 5 amperes at 1,000 volts. There is a limit, however, to the extent this principle may be applied. It is not practical to use a voltage as high as 1,000 for incandescent lighting, on account of the danger to life, leakage, and difficulties attending the manufacture of the lamps; hence, when the electrical energy is to be distributed over distances of as much as one or two miles, the current is generated as an alternating current at, say, 1,000 volts, and changed, by means of a transformer, to a potential of 100 volts before it enters the house or place where it is to be used. The loss in transformation is slight if the transformer is properly constructed.

When very great distances are to be overcome, the current is generated at as high a potential as is practical; it is then transformed to a still higher potential by means of a step-up transformer, transmitted at this potential, and changed back again by a step-down transformer at the other end of the line.

§ 77. Rotary Transformers. A rotary transformer is not, strictly speaking, an induction-coil, but a dynamo and motor combined. The armature has two sets of windings, one of which receives the current to be transformed, and drives the machine as a motor; the other set of windings on the armature generates a current at the potential desired. Both armatures have a common axis, and rotate in the same magnetic field.

§ 78. Choking-Coil. A choking-coil is one having large self-induction, but little resistance, and used as a resistance for alternating-currents. The primary of a transformer is a good example of such a coil, when the secondary circuit is open. They are usually constructed so that the self-induction may be varied by varying the magnetic field, or the number of turns in the coil. Such a coil has the property of cutting down the current, but without the expenditure of energy which would take place were a simple resistance used.

§ 79. Dynamo Electric-Machines. Any treatment of the subject of electromagnetic induction would be incomplete without at least the elementary theory of the *dynamo electric machine*, which is by far the most important application of this principle. In the following articles no attempt is made to cover any but the most important and essential features of typical forms.

A *dynamo electric-machine*, or simply *dynamo*, may be defined as a machine for converting mechanical energy into the energy of an electric current; it consists of a series of conducting circuits, so arranged that the magnetic flow through them is continually changing. Figure 60 is a diagram of a typical dynamo. A is the armature, made of soft iron, and carrying on its surface the conductors through which the magnetic flow is made to change, and in which the current is generated. S and N are the poles of an electromagnet, F, called the field-magnet; C is the col-

lector, made of pieces of bare metal connected to the revolving conductors of the armature. The brushes, B, serve to connect the revolving circuits of the armature with the outside or main circuit.

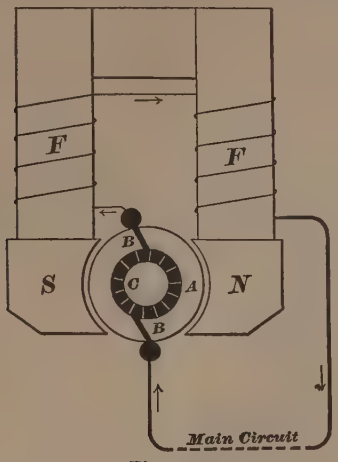


Fig. 60

A single closed circuit rotating in a uniform magnetic field, as shown in Fig. 61, constitutes

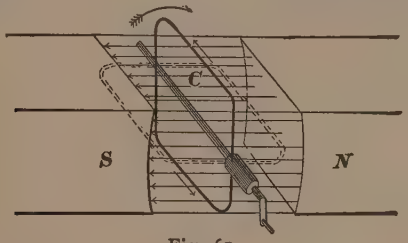


Fig. 61.

the simplest possible dynamo. Let the circuit, C, rotate in the uniform field produced by the poles, S and N. Consider one complete revolution of the upper side of the conductor, C, and represent the different positions by 1, 2, 3, etc., in Fig. 62.

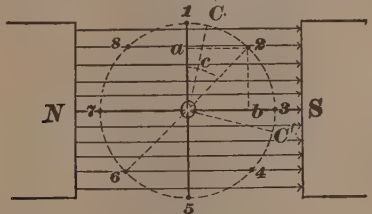


Fig. 62.

At position 1, the circuit incloses the maximum number of lines; at position 2, the number of lines is proportional to the line O*a*, the exact number being F cos θ, F being the maximum flow, and θ the angle moved through. At the position 3, the circuit does not inclose any lines; at position 4, the lines thread through from the opposite side of the loop, which is equivalent to a decrease in the flow from a maximum at 1 to a maximum at 5 in the other direction. At 7, the flow is again O, and increases to the maximum at 1; hence the magnetic flow through the circuit varies as the cosine of the angle revolved through.

The electromotive force generated in the circuit at any time does not depend on the flow, but the rate at which the flow is changing. At position 1, there is a large number of lines through the circuit, but if it be moved through a small angle, CO1, the number of lines is nearly as great as before, while at 3 the same small angle C′O3 would produce a large change in the flow, hence the E.M.F. will be 0 at 1 and 5, and a positive maximum at 3, and a negative maximum at 7.

Let the circle (Fig. 63) be divided up into a great number of small angle parts $d\theta$, and let dt be the time required for the conductor to revolve through this angle $d\theta$. The E.M.F. generated at any time is $\frac{d\mathrm{F}}{dt}$ where dF is the change in the number of lines through the circuit in the small time, dt; ab may be considered as a straight line and proportional to dt, and ac is proportional to dF; hence the E.M.F. is $\mathrm{E} = \frac{a\mathrm{C}}{ab} = \frac{a\mathrm{O}}{ad} = \sin\theta$; hence the E.M.F. varies as the sine of the angle of displacement.

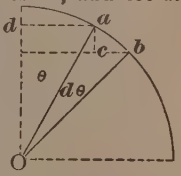


Fig. 63.

These relations can best be represented by curves, as in Fig. 64. The horizontal distances

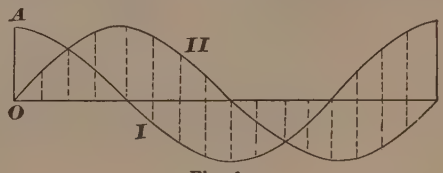


Fig. 64.

represent equal increments of time begun at 1 (Fig. 62); the vertical distances of the curve I are the values of the cosine for the different positions of the conductor, and represent the changes in the magnetic flow. The corresponding values of the sines are shown in curve II, the ordinates of which represent the induced E.M.F. The maximum values differ by 90°, or a quarter of a period. The current in such a circuit changes direction to correspond with the change in direction of the E.M.F.; such a current is called an alternating current.

In case it is desired to send the current always in the same direction, the coil terminates in two parts of a split tube, *a* and *b* (Fig. 65) insulated from each other, and from the shaft; the brushes, *c* and *d*, are placed so that they exchange contacts the same instant that the circuit reverses, thus sending the current in the same direction, but varied as before, all the curves lying above the axis, as in Fig. 66.

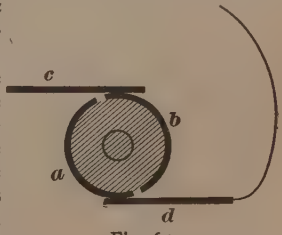


Fig. 65.

This arrangement is called a commutator.

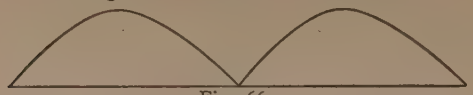


Fig. 66.

§ 80. Ring Armature. The gramme ring is one of the simplest, and occurs frequently in continuous current-machines. Its construction is shown diagrammatically in Fig. 67. The core, C, is a laminated iron ring; the wires are wound on the ring in one continuous spiral. In the figure the spiral is divided into eight coils, the end of one coil connected to the beginning of the next, as well as to one of the collector-bars, which are insulated from the shaft and from each other.

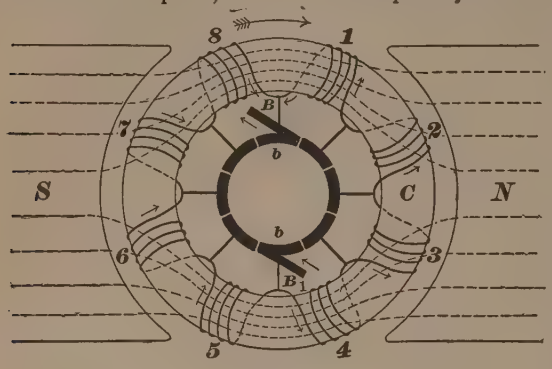


Fig. 67.

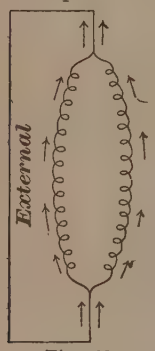


Fig. 68.

The current in coils 1, 2, 3 and 4 will be in the direction indicated by the arrows, and out through the brush, B, to the external circuits and back to the brush, B_1. If the coils 5, 6, 7 and 8 are examined, the current is found to be opposite in direction to the coils on the right half, but both currents have the common outlet, B, and inlet, B_1. The coils of each half are in series, and the two halves are in parallel, as shown in Fig. 68.

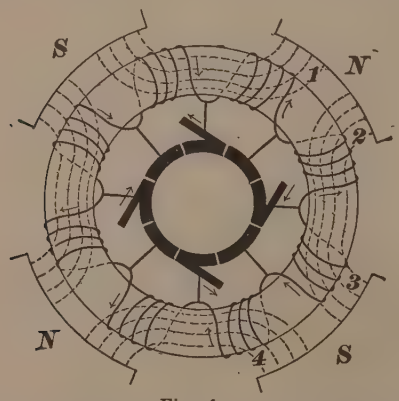


Fig. 69.

Fig. 69 shows the same type of armature, but rotating in a field due to four poles. The number of poles may be any even number; when more than two poles are used, the dynamo is said to be multipolar. The alternate brushes, being at the same potential, may be connected together, or the coils may be permanently connected across, so that two brushes suffice.

§ 81. Drum Armature. If, in Fig. 67, the coils are supposed to enlarge until they include the opposite side of the ring, the armature becomes a *drum armature;* the core would, of course, be

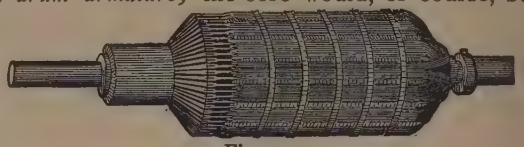


Fig. 70.

a laminated cylinder. Fig. 70 shows the construction of a drum armature.

§ 82. Field-Magnets. The field-magnets of a dynamo are usually made of good cast-iron. Cast-iron is not as permeable as wrought-iron, but the former is much more easily shaped, and since the armature requires a certain amount of space for the required number and size of conductors, the cross-section of the field is usually of such a size that the cast-iron cores may be enlarged enough to compensate for the poor permeability.

In many machines the cores of the field-magnet coils are made of wrought-iron, but united at the base by the cast-iron frame of the machine, and capped by cast-iron pole-pieces in order to get the required cross-section of field.

The field-magnets are excited by the current of the machine; the method of winding the coils depending upon the use to which the machine is to be put. In all cases there is enough residual magnetism to start the machine.

Fig. 60 represents a *series-wound* machine. The current leaves the upper brush, B, and is all sent through the coils of the field-magnets; that is to

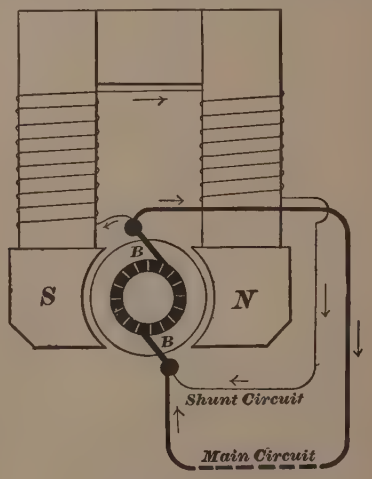


Fig. 71

say, the coils of the field-magnets are a part of the main circuit.

In the *shunt-wound* machine (Fig. 71) the field-

magnets are wound with many turns of fine wire, and the terminals of the coil are connected directly with the brushes; hence the current arriving at the positive brush has two paths by which it may return to the negative, one around through the main circuit, the other through the field-magnet coils; the proportion of the current in each path is inversely as the resistance. Since but a small amount of the current is needed to energize the field, the coils are made of high resistance.

If, in the last case, a few turns of the main circuit are placed on the field, they become *compound-wound*. (See Fig. 72.)

§ 83. Constant-Current Machines. The load of a dynamo is usually added in one of two ways. In the first, the resistances are added in series, as in the case of arc lamps, and each lamp means so much resistance added to the main circuit. This would require that the machine should increase its potential as the load is added, or, what is the same thing, maintain a constant current. In the case of the series-wound machine, more resistance added to the main circuit would lessen the current, thus weakening the fields, when they should be made stronger. When a series-wound machine is used under these conditions, some mechanical device is used to regulate the field by cutting turns into or out of the field-magnets.

The shunt-wound machine, when an increased load means an increased resistance, would regulate, since, then, the greater the load or external resistance, the greater the current through the field-coils, but other disadvantages exclude the shunt in favor the series-wound with mechanically regulated fields for purposes requiring constant current.

§ 84. Constant-Potential Machines. In the second case, the resistances are added in parallel; an increase of load meaning a decrease in resistance, as in incandescent-lighting and electric railways. In such cases it is required that the dynamo should supply current at a constant potential, but varying in amount.

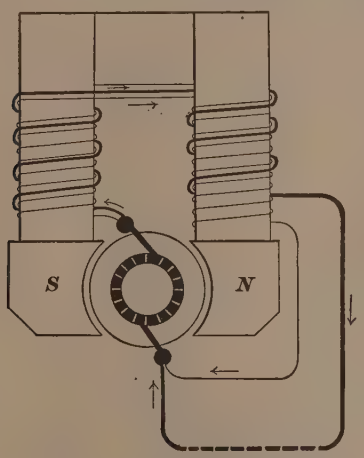


Fig. 72.

If a shunt-machine were used, a decrease of resistance in the external field would cause less current to go through the shunt, when there should be more. The current in the main circuit, however, is increased because its resistance has been decreased, but the increase is not sufficient to compensate. The drop or decrease in the shunt-current is not excessively large, and may be compensated by putting a few turns of the main circuit around the field-coils; it then becomes a compound-wound machine, and beautifully self-regulating for constant potential. (Fig. 72.)

§ 85. Alternating-Current Dynamos. An alternating-current dynamo is one in which the current is periodically changing its direction, as in the case of the current resulting from the E.M.F. generated by the single coil of Fig. 61. The time taken for one complete alternation to and fro is called the *period*, and the number of complete alternations per second is called the *frequency*. The frequency used in practice varies from 50 to 150 per second.

Since a two-pole machine gives but one alternation per revolution, alternators are multipolar, with 8 to 22 or more poles; the number of alternations per revolution of the armature is equal to the number of pairs of poles. By this means the desired number of alternations per second is obtained without increasing the speed of the armature beyond practical limits.

The arrangement of the armature-coils and field-magnet is shown diagrammatically in Fig. 73. The coils of the armature are turned to the front, in order that the method of connecting them may be seen. The two contact-rings at which the armature circuit terminate, are also turned to show the connection; the contact-rings are two complete rings insulated from the shaft, but revolving with it, the connection with the outside circuit being made with brushes, as usual. Since the poles of the field-magnet alternate north and south, the alternate coils of the armature are reversed as to the direction of the winding, so that the current induced by all poles is in the same direction at any one time; the current reverses each time the coils pass the point midway between the poles. The armature of an alternating-current dynamo may be of either the ring, drum or disk type. Fig. 74 shows an alternating-ring armature; the sec-

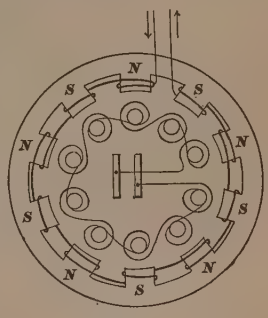


Fig. 73.

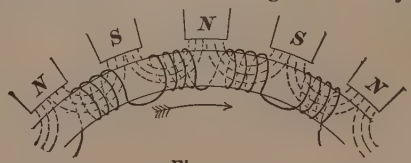


Fig. 74.

tions are wound alternately right and left handed.

Fig. 75 shows a drum armature; the windings lie flat on the outside of the drum, the ends of the coils being bent over the end of the drum, as shown. The coils are often sunk in grooves along the surface of the drum.

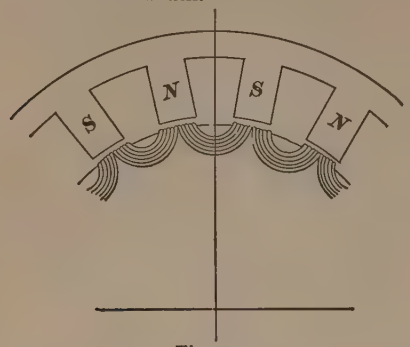


Fig. 75.

The field-magnets of alternators are usually excited by a current from some outside source, commonly a small direct-current dynamo.

Alternating-current dynamos are generally used when the current is to be transmitted over long distances, since the current can be generated at a high potential for transmission and reduced at the other end by means of transformers.

§ 86. Alternating Currents. In any circuit containing an alternating E.M.F., the value of the current at any time would be, by Ohm's law, the E.M.F. at the instant divided by the resistance of the circuit, provided there was no self-induction in the circuit; but since there is self-induction in any circuit in which the current is changing, the effective E.M.F. at any time is less than the impressed E.M.F.; hence the current does not follow the E.M.F., but reaches its maximum value later. If we consider the current as produced by the single circuit of the simple dynamo (Fig. 61), the E.M.F. may be represented as before by the sine curve, E (Fig. 76). The E.M.F. reaches its first maximum at 3 (Fig. 62); but while the E.M.F. has at that position

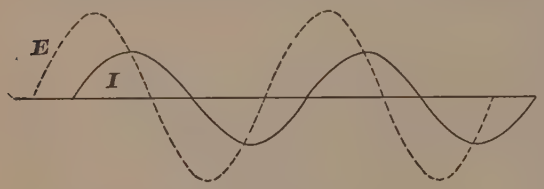


Fig. 76.

its maximum value, its rate of change is 0, and the current due to it at that instant would not be changing; and as the self-induction depends upon the rate of change of the current, the reverse E.M.F. due to self-induction would have a maximum value at the place where the impressed E.M.F. has the greatest rate of change, which is necessarily 90° from the position where it is at a maximum.

The effect of the reverse E.M.F. due to self-induction is to cause the current to lag behind the impressed E.M.F., as shown by the curve I (Fig. 76). The angle between the maximum E.M.F. and the maximum current is called the *lag*.

The effective E.M.F. producing the current must, of course, correspond to the current and its maximum value is RI, where R is the resistance of

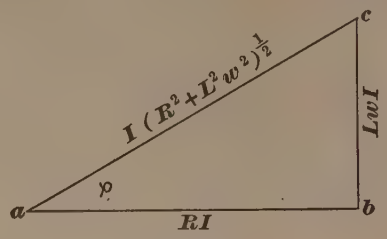


Fig. 77.

the circuit, and I the maximum current. The E.M.F. due to self-induction at any time is L times the rate at which the current changes, or $L\omega I \cos \omega t$, which gives $L\omega I$ as the maximum value, since then $\cos \omega t = 1$, where L is the coefficient of self-induction, and ω the angular velocity.

If the maximum effective and self-induced electromotive forces are represented by the two sides of a right triangle (Fig. 77), the hypothenuse will represent the maximum impressed E.M.F. Therefore we may write $E = I(R^2 + L^2\omega^2)^{\frac{1}{2}}$, or $I = \frac{E}{(R^2 + L^2\omega^2)^{\frac{1}{2}}}$. The expression $(R^2 + L^2\omega^2)^{\frac{1}{2}}$ is called the *impedence*, and is the actual resistance offered to the flow of current. The effect of the self-induction on the value of the current is equivalent to added resistance. No energy is lost in overcoming the resistance, as in the case of ohmic resistance, the machine being simply reduced in capacity. The angle c a b is evidently the angle of lag φ; hence $\tan\varphi = \frac{L\omega}{R}$.

§ 87. Virtual Volts and Amperes. Instruments for measuring alternating currents and voltages depend upon the attraction between currents, as in the case of the electrodynamometer (§ 54) or the heating effect of the current. Since either of these effects varies as the square of the current, the instruments, when used to measure alternating currents, indicate the square root of the average square of the current or voltage throughout the cycle; the values of the readings given by these instruments are called *virtual* volts and *virtual* amperes.

The virtual values exceed the arithmetical mean values by 10 per cent. A continuous current and an alternating current of equal virtual value have the same heating effect; but a continuous current equal to the arithmetical mean of the alternating one will have a smaller heating effect in the ratio of 1 : 1.23 (or $.637^2 : .707^2$).

§ 88. Polyphase Currents. If the armature of any alternator be wound with two sets of coils, one ahead of the other, and each connected with a separate outside circuit, two alternating currents may be generated alike in period and intensity.

but differing in the position of maximum value, or phase as it is termed, by an amount depending upon how much one set of coils is ahead of the other. Fig. 78 represents two alternating currents differing by one quarter of a period, or simply with a difference of phase of one fourth; the currents in this case are usually referred to

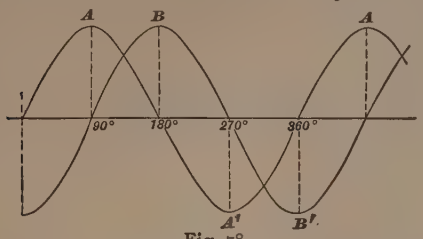


Fig. 78.

as a *two-phase* system of currents. Three currents generated by the same machine would constitute a three-phase system of currents, as shown in Fig. 79. The terms *polyphase* and *multiphase* are

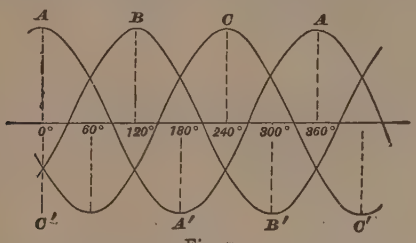


Fig. 79.

used to designate any system of more than one alternating current, each current having its own separate circuit or the equivalent, since, as will be seen later, a conductor may serve as a part of two different circuits.

§ 89. Rotary Magnetic Field. If the currents of a two-phase system are properly com-

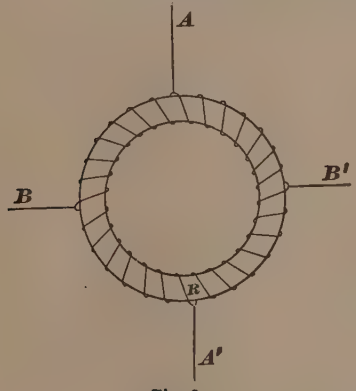


Fig. 80.

bined, they can be made to produce a *rotary magnetic field;* masses of metal and conductors, when placed in a rotary field, have currents induced in them, and the action between these currents and the field may be utilized to produce continuous rotation. Let R (Fig. 80) be a soft iron ring wound with a continuous coil. If a single alternating current is introduced at A and A′, it would set up an alternating magnetic field in the ring, a north pole growing at A and a south pole at A′, then dying away and reversing in direction. If a similar alternating current is introduced at B and B′, but differing from the first by one fourth of a period, it would also produce an alternating magnetic field, and the effect of the two is to produce a rotary magnetic field, though the coil itself is stationary. Let three alternating currents, differing from one another by one third of a period, or 120°, be led into a ring-wound, as shown in Fig. 81, at the points A, B and C; the current flows in first at A and out by B and C, then in at B and out at C and A, then in at C and out by way of A and B, thus producing a rotating magnetic field as before. Inside the ring is placed a rotor,

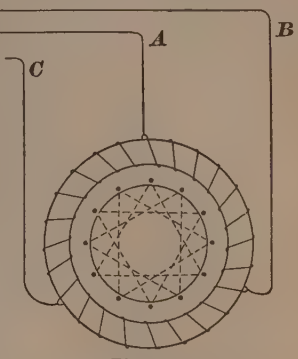


Fig. 81.

as it is termed, consisting of a laminated iron cylinder mounted upon an axis; heavy conductors are placed in grooves at the surface of the rotor and parallel to the axis of rotation; they are connected together at the ends, as shown in Fig. 81. The induced currents in this system of conductors are pulled around by the rotating field. The strength of the currents in the rotating part depends upon the relative speed of the field and rotor. If they rotated at the same speed, no current would be induced, and there would be no driving force. The rotor has no commutator or brushes, and is entirely separate from any other circuit. It receives its currents wholly by induction; such motors are termed *asynchronous motors.*

§ 90. Electrodynamic Action between Alternating Currents — Thompson's Experiments. A harmonic current induces a harmonically varying E.M.F. in an adjacent circuit, which gives rise to a current also harmonic and of the same period. The difference in phase between the two currents cannot be less than $\frac{\pi}{4}$ or greater than $\frac{\pi}{2}$, for the secondary E.M.F. is retarded by an amount $\frac{\pi}{4}$ with respect to the primary current, and the self-induction produces a further lag between 0 and $\frac{\pi}{4}$ in value.

Professor Elihu Thompson has devised a number of experiments to show that there is always repulsion between the two currents. Fig. 82 represents a large electromagnet; the core is of iron wire, well insulated, and the coil consists of a few layers of heavy wire. When a strong alternating current is sent through the coil, a simple

circuit or ring is repelled with considerable force.

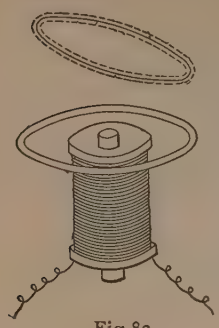


Fig 82.

The force between the magnet and ring at each instant is proportional to the strength of current equivalent to the magnet and that of the ring. The two currents will attract if they are in the same direction, and repel if opposite.

Let the two currents be represented by the two sine curves A and A′ (Fig. 83), having the same period, but a difference in phase of $\frac{\pi}{4}$ and with amplitudes as 4 to 1. The ordinates of the curve B are taken equal to the products of the ordinates of A and A′ at the points, and are drawn above the line if the product is positive and below when negative. In this case the attraction

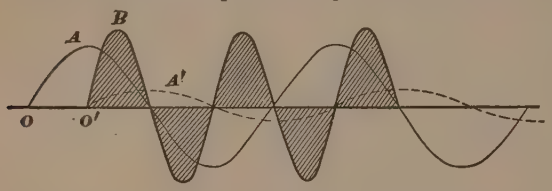


Fig. 83.

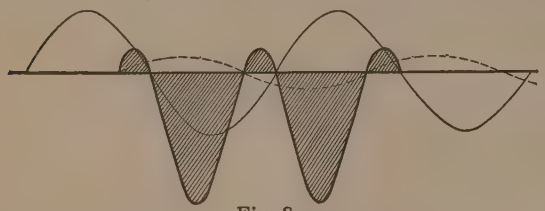


Fig. 84.

and repulsion are equal, and hence there is no effect. But if the difference of phase is greater than $\frac{\pi}{4}$, the curve B takes the form shown in Fig. 84, and the repulsion is greater than the attraction. Fig. 85 shows another experiment, in which the force of repulsion is made to produce rotation. The copper disk, B, mounted on an axis, rotates when it is placed eccentrically in reference to the alternate pole and partially screened by the disk, A. If A is movable, it will turn in the direction opposite to that of B. The rotation is caused by the repulsion of the currents induced in the metal of the disks by the magnet.

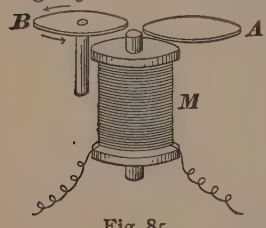


Fig. 85.

§ 91. Electrical Resonance. If a condenser having a certain period of oscillation (§ 92) in the neighborhood of a similar condenser of the same frequency, oscillations are set up in the second condenser, much the same as one tuning-fork or sounding-body may excite vibrations in another body having the same period of vibration. This phenomenon is known as *electrical resonance*, and is very important, since it suggests a wave-motion in the medium as the means by which the energy is transmitted across space.

Any electric circuit having certain relations between its self-inductive capacity and resistance has its own particular periods of electrical oscillations, and is extremely sensitive to impulses or changes in the medium about it when properly timed.

§ 92. Oscillatory Electric Discharge. If the coatings of a charged condenser or Leyden jar be connected by a conductor of small resistance there is a sudden electric current from one coating to the other, through the conductor, but, owing to the self-induction of the conductor, the current does not stop when the discharge is complete, but rushes on and charges the condenser in the opposite way; then follows a reverse discharge, which also rushes beyond the neutral point, and the condenser is once more charged in the original way. Each successive oscillation is feebler than the preceding, so that after a number of oscillations the discharge dies away, as shown in Fig. 86. The conductor between the two coatings usually contains an air-gap, the two ends of the conductor at the gap terminating in polished metal spheres (see Fig. 87); as the condenser is charged, the air-gap prevents a discharge until the potential is sufficiently high to overcome its resistance, when the air suddenly gives way and the *spark* "passes," to use the ordinary term. The effect is the same as that of suddenly introducing a conductor into the gap; the light of the spark is due to the heat generated by this passage of the current. The oscillating nature of the electric discharge may be illustrated by two tanks containing water at different levels, and suddenly connected by a pipe, with little resistance to the flow of water, as in Fig. 88.

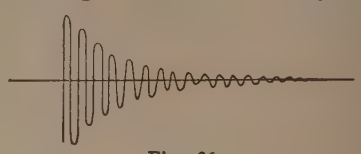


Fig. 86.

Fig. 87.

T and T′ are the tanks filled to the levels *a* and *c*, respectively; *b* is the common level when the valve at *d* is open. If the valve is suddenly opened (it might be a membrane which bursts when the level of the water in T is sufficiently above that in T′), the water in T rushes to T′; it does not stop when the common level, *b*, is reached, but rushes beyond, owing to the inertia of the water, and fills the tank T′ with more water than T; then the same thing will occur in the opposite direction, the water settling down to a common level only

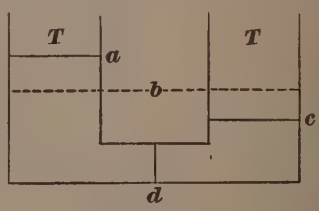


Fig. 88.

after several oscillations. It is evident that the frequency of the oscillations will depend upon the mass of water and the resistance of the connecting pipe; if the resistance of the connecting pipe is large, which would be the case if it were a small pipe, it is easily seen that there would be no oscillation. In the analogy, the capacity of the tanks corresponds with the capacity of the condenser, the inertia of the water to self-induction, and the resistance of the connecting pipe to the electrical resistance of the conductor. If the capacity of a condenser is K (farads), the resistance of the conductor R (ohms), and its self-induction L (henries), oscillations will occur if $R < \sqrt{\frac{4L}{K}}$, and no oscillations if $R > \sqrt{\frac{4L}{K}}$; in the former case the frequency of the oscillations is given by the equation $2\pi n = \sqrt{\frac{1}{KL} - \frac{R^2}{4L^2}}$. The oscillations of an ordinary Leyden jar last only from $\frac{1}{10000}$ to $\frac{1}{1000000}$ of a second.

By using a large condenser and a well-insulated coil for resistance, Lodge succeeded in slowing down the oscillations to 400 per second; the spark then emitted a musical note. The oscillatory character of the discharge may be seen by viewing the spark with a telescope and revolving mirror.

§ 93. Electric Waves. If a current increases in strength, the magnetic field about it increases; the circular lines of force which surround the currents (§ 46) may be pictured as enlarging and traveling outward, much the same as the ripples caused by dropping a pebble on the surface of water. When the current decreases, the circular lines decrease in diameter and return to the conductor, but if these changes in the magnetic field be extremely rapid, as when electric oscillations (§ 91) are taking place in the conductor, electromagnetic waves are set up in the space about the conductor, which travel out through the medium with the velocity of light. Maxwell predicted in 1865 that such waves existed, and put forward the theory that light-waves are very short electrical undulations, partly electric and partly magnetic. This theory is known as the *electromagnetic theory of light*, and according to it, electro-magnetic phenomena and the phenomena of light are all due to certain modes of motion in the ether, electric currents and magnetic fields being streams and whirls in the substance of the ether, while light is due to the vibrations in it. An electric displacement while taking place produces a magnetic force at right angles to itself; it also produces (by induction) an electric force, which is propagated at right angles both to the electric displacement and the magnetic force. Now it is known that, in the propagation of light, the motion or displacement of the ether is at right angles to the direction of the ray,—a striking analogy and an important piece of evidence in favor of the theory. It has been calculated in several ways that the velocity of propagation of electromagnetic disturbances is 2.9857×10^{10} centimeters per second, while the velocity of light, according to the best determinations, is 29992×10^{10}. centimeters per second. From the equations for the propagation of a disturbance in an electromagnetic medium having a specific inductive capacity k (§ 36) and a permeability μ (§ 57), Maxwell showed that the velocity of propagation should be $\frac{1}{\sqrt{k\mu}}$. It follows that if light is an electromagnetic phenomenon, its velocities in two media having the same permeability, but different specific inductive capacities, ought to vary inversely, as $\sqrt{k}$. This velocity ratio is called their refractive index, hence, according to the theory, the specific inductive capacity of an ordinary transparent medium ought to be equal to the square of its refractive index. The agreement has been found to be fairly close for long waves; the following table gives the value of K and the square of the index of refraction of four common dielectrics:

	K.	(Index)^2
Flint glass	3.162	2.796
Bisulphide of carbon	1.812	2.606
Sulphur	4.151	4.024
Paraffine	2.32	2.33

Another consequence of the electromagnetic theory is, that conductors, since they dissipate the energy of currents set up in them, ought to be opaque to light; this is generally true except in the case of liquids which conduct electricity in an entirely different manner (see Electrolysis, in these Supplements); hence they do not form an exception. In some crystalline bodies the electrical conductivity is better in one direction than in another; in these the opacity to light differs accordingly. But the most commonly experimented proofs of Maxwell's theory were brought out in 1888 by Hertz, who succeeded in producing electromagnetic waves in a way which enabled him to examine their properties. He showed that while the rays are much longer than light-waves, they possess the same properties, travel at the same speed and are capable of being reflected, refracted and polarized. They also exhibit interference phenomena, the test of wave-motion. Hertz used as a source of waves an apparatus which he called an *oscillator*, or vibrator, one form

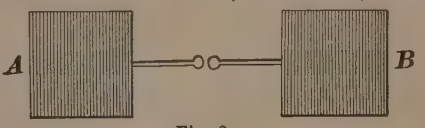


Fig. 89.

of which is shown in Fig. 89. It consists of two conductors, A and B, connected by two metal rods and a spark-gap between two small well-polished metal balls.

To detect the waves he used a *resonator*, which consisted of a simple circuit of wire (Fig. 90), having in it an adjustable spark-gap. The

simple circuit is called a resonator from the fact that it gives the best results when the natural period of oscillation set up in it is the same as the period of oscillation in the vibrator. In one experiment the oscillator consisted of two zinc plates, A and B (Fig. 91), 40 c.m. square and mounted 60 c.m. apart; each plate is provided with a short copper wire terminating in a polished ball, the space between the two balls constituting the spark-gap. The oscillator may be considered as a simple condenser, the two plates forming the coatings. An ordinary induction-coil is connected to the oscillator, as shown; when the two

Fig. 90.

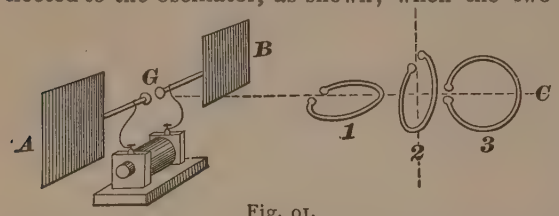


Fig. 91.

plates become charged to a high potential, the air breaks down and an oscillatory discharge takes place, consisting of a dozen or so oscillations (§ 92), and as long as these oscillations last, the wire connecting A and B through the spark-gap carries an alternating current of extremely high frequency, thus producing about the conductor an alternating magnetic field of the same frequency, which is high enough to send out waves in the ether. In this particular case the resonator was 35 c.m. in radius. Let the line of the conductor connecting A and B be the line of oscillation, and GC drawn at right angles to it, a convenient reference-line. If the resonator is placed with its center on the reference-line, and turned first in the position shown at 1, sparks pass in the spark-gap of the resonator when a discharge takes place in the oscillator, and they are brightest when the spark-gap is nearest the oscillator, for in that case the induced spark is parallel to the line of oscillation. If the resonator is turned to the position shown at 2, sparks pass when the gap is at the top and bottom of the circuit, but none if the gap is on the side. When the resonator is placed as at 3, no sparks are observed, whatever the position of the gap; we have then electrical oscillations set up in the resonator similar to those in the oscillator; and it is difficult to conceive of this effect being caused by any other than periodic disturbances in the medium, which are propagated across space, and require a finite time for their propagation; in other words, a wave motion. Hertz showed that the radiation is reflected by, using two large parabolic mirrors, as shown in Fig. 92.

The oscillator, R, was placed in the focal line of the mirror A. The detector in this case, consisting of two long wires, was placed in the focal line of the mirror B; the wires of the detector were bent back, so that the spark-gap was outside the mirror, in a position convenient to be seen. When the mirrors are placed facing each other, as shown in the figure, if this electrical action through space is in the form of waves, they should, after reflection from the first mirror, emerge as parallel rays, and, falling upon the second mirror, be concentrated at its focal line, and produce a much greater effect in the receiver than when the

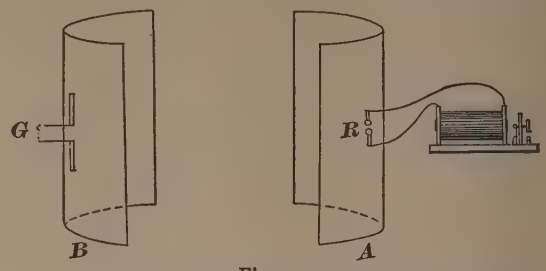


Fig. 92.

mirrors are not present; this was found to be the case. Hertz further showed that the radiations were reflected by placing the mirrors as shown in Fig. 93. No sparks passed in the detector when the vibrator was in action until a metal plate, M, was placed at the right angle to reflect the waves into the second mirror, and a slight variation of this angle caused the sparks to disappear. To

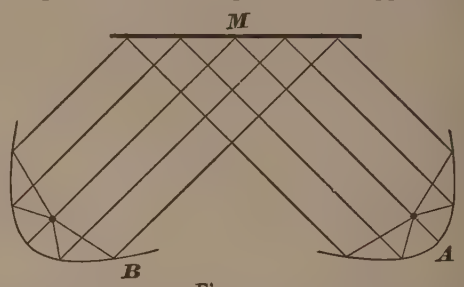


Fig. 93.

show that the electrical radiation is refracted, Hertz used a large prism of pitch one and five tenths meters high, one and two tenths meters along the edge, and a refracting angle of 30°. When the prism was placed between the two mirrors shown in Fig. 92, the second mirror had to be moved to produce a spark in the detector, thus showing that the radiation is refracted; the index of refraction of the pitch for these waves was found to be 1.69. By using a plain metal reflector at some distance from an oscillator, standing waves should be set up between the oscillator and the plate; the resonator, when placed in different position between the plate and oscillator, clearly showed the maxima and minima, or nodes and loops as they are termed. Therefore, since the electrical radiation can be shown to possess all the properties of light-waves, it is reasonable to suppose that they are disturbances of the same kind and in the same medium, but differing in wave-length, the length of the waves in Hertz's experiments being of the order of a meter in light. Recently, Hertz's experiments have been repeated by others, using waves but a few millimeters in length. Other means have been devised for detecting electric waves, such as a sensitive vacuum tube, electrometer, thin wires

which expand when heated, and thermo-electric couples. Lodge has recently brought out the most sensitive detector of electric waves; it consists of a glass or paper tube filled with coarse iron filings. This tube is placed in circuit with a battery and galvanometer, the galvanometer showing a deflection depending upon the resistance of the filings: but if the electrical radiation is allowed to fall on the tube, the resistance of the filing, is greatly reduced, thus causing a large increase in the deflection of the galvanometer. This detector is extremely sensitive, and is capable of detecting the electric radiation when placed at a distance of several hundred feet from the oscillator. The form of the oscillator has lately been very much improved; it often consists of two small spheres, a centimeter in diameter or smaller, immersed in oil. The oil prevents the balls from tarnishing, as it is necessary to keep the surfaces between which the gap is formed continually bright. The balls are made smaller, since they will then have a smaller capacity, and the oscillations a correspondingly high frequency, thus giving a short wave-length.

§ 94. Discharge at High Potential. As the potential of the current causing a disruptive discharge increases, the nature of the discharge changes its appearance. At first the spark is a thin bright line between the terminals; this line grows broader (the coil furnishing a high potential current) and becomes more like a flame as the potential of the current increases, and finally, at very high potential, breaks into numbers of small sparks, which shoot out in all directions from each terminal, totally irrespective of the relative positions of the two. When this point is reached, an exhausted bulb, such as a Crookes tube, will light up when attached to only one (it is immaterial which one) of the terminals. If two long wires, one end of each attached to each terminal of the generator, be stretched out parallel to each other (Fig. 94), the space between will be filled with showers of fine sparks, so that the whole has the appearance of a band of soft light. If two metal plates (Fig. 95) be set up parallel to each other, several feet apart, and each connected with one terminal of the generator, there will be no apparent discharge, but an exhausted bulb, when brought into the space between the plates, will glow with a soft white light. If the potential of the discharge is high enough, it can be taken through the body, not only without harm, but without sensation of any kind. The discovery of these, and many other beautiful effects of high potential discharges, and the invention of the simplest means of producing them, are due to Tesla. (See Tesla Coil, § 75.)

Fig. 94.

§ 95. Discharge in High Vacua—Cathode Rays. When a disruptive discharge passes between electrodes in a rarefied gas, the appearance of the discharge at the positive and negative electrodes is so strikingly different that the discharge loses all appearance of uniformity. Around the

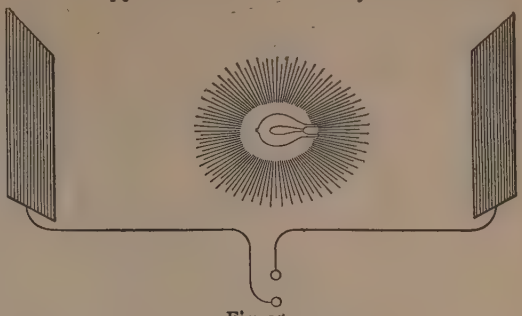


Fig. 95.

negative electrode or cathode there is a dark space, and then alternate bright and dark bands, the size and number of which depend on the degree of rarefication of the gas.

Fig. 96.

Fig. 96 represents the appearance of the discharge under these conditions. The exhausted tube is known as a *Geisler tube.* Crookes found that if the exhaustion be continued, the dark space about the cathode increased in width, and that across the space electrified molecules were projected in lines perpendicular to the surface of the electrode. If the exhaustion be pushed almost to the limit, the dark space fills the entire tube, and the streams of electrified molecules, or *cathode rays* as they are termed, impinge against the glass wall of the tube, causing the glass to emit a beautiful fluorescent light, the color depending upon the nature of the glass; the tube is then known as a *Crookes tube.* Hard German glass gives a greenish yellow light, probably due to the small amount of uranium it contains, while lead glass fluoresces with a pale blue light. A solid object placed in the path of the cathode rays protects portions of the glass, thus casting a shadow, the fluorescence only appearing on the glass where the cathode rays strike.

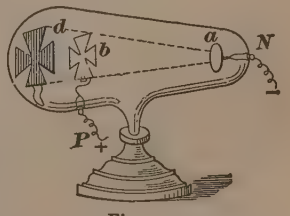


Fig. 97.

Fig. 97 shows a shadow tube; *a* is called the cathode, *b* is a plate of metal mounted inside the tube and in the path of the rays; *d* is the portion of the glass protected from the cathode rays by the screen, *b*. Diamonds, rubies, many crystals and

salts, when placed in the path of the cathode streams, become brilliantly fluorescent (Fig. 98). Calcium tungstate, under these conditions, emits a very brilliant bluish white light; it has been proposed to utilize this light for purposes of illumination.

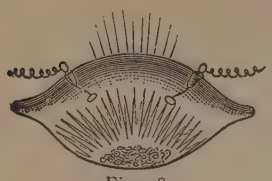


Fig. 98.

Cathode rays develop heat when they impinge against a substance; the effect can be greatly magnified by making the cathode a concave plate, as shown in Fig. 99. The rays are thus concentrated on a platinum plate, P, which becomes intensely heated and is incandescent.

The rays are attracted by a magnet, and exert a force upon the object against which they strike. This is shown by the tube in Fig. 100; the cathode is concave, and concentrates the rays on the screen *d*. A magnet placed at *m* deflects the rays so that they strike against the veins of the pivotal wheel, causing it to rotate.

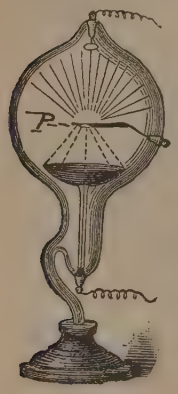


Fig. 99.

If, in these tubes, the exhaustion is pushed to the extreme limit, the discharge no longer takes place through the tube, going, in preference, through many centimeters of air; hence the electric discharge cannot pass through a vacuum.

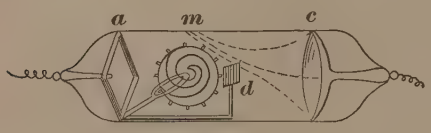


Fig. 100.

Crookes, who devised these tubes and many others, attributed the phenomena to streams of charged gaseous molecules repelled from the cathode, but their exact nature is yet a matter of doubt.

In 1892 Hertz discovered that thin films of gold are somewhat transparent to these cathode rays, —a discovery that led him to believe he could get them outside the tube, and so study their properties in air. This was actually accomplished by Lenard the following year. Lenard succeeded in getting the cathode rays outside his exhausted receiver through a small, thin window of aluminium foil. He discovered that in air the cathode rays are not a prolongation of the cathode stream in the vacuum tube, but that they spread out diffusely from the window; that they differ from light in their penetrating power, being able to pass through aluminium, but not through glass. He concluded that they were not electrical rays, as conductors were not opaque to them; he also found that their penetrating power is roughly inversely propositional to the density of the substance; that they cause fluorescence when allowed to fall on certain substances, and are capable of acting on a photographic plate; that an electrified body loses its charge when these rays are allowed to fall upon it; that they were deflected by a magnet always in a vacuum, and sometimes in air. Lenard considered these rays, which he called *cathode rays in air*, an ethereal phenomenon, and not charged particles of gas. The late discoveries of Roentgen and other physicists, working along the line he proposed, have added greatly to our knowledge of these phenomena.

§ 96. Roentgen Rays and Photography. Professor Roentgen, in 1895, made the startling discovery that when the cathode rays inside a Crookes tube impinge on the glass they originate a new form of radiation hitherto unknown. These he termed, for brevity, "X rays," on account of their unknown character; however, it is but just that they should be termed "Roentgen rays," in honor of the discoverer. Roentgen, in his original paper, ascribes to these rays the following properties: They excite fluorescence in many substances, the most sensitive being barium platino-cyanide, which showed fluorescence when placed at a distance of two meters from the tube; a screen of cardboard covered with this salt formed the detector used by Roentgen in many of his experiments. The rays possess the property of penetrating substances opaque to light, such as a book of one thousand pages, thick blocks of wood, aluminium, 15 m.m. (approximately 9-16 of an inch) thick, thick glass plates, ebonite several centimeters thick; and the hand, if held before the fluorescent screen (between it and the tube), shows only a shadow of the bones, since the flesh allows the rays to pass almost unobstructed, while the bones are opaque. It is this property of the Roentgen rays which has interested the public more than any other scientific discovery of late years. Many important applications of it have been made in surgery, and time will no doubt develop many more.

Water and several other liquids are very transparent, but the metals are in general opaque. Plates of gold, silver, copper, platinum and lead allow the rays to pass, but only when the plates are thin; the opacity of bodies for these rays seems to depend only on their density. The rays are not refracted or regularly reflected to any great extent, if at all, nor do they give rise to interference or polarization phenomena; in these respects the radiation is totally unlike ordinary light.

Photographic dry plates are sensitive to the rays, and, as a consequence, a new photography has been developed, in which the object is depicted according to the transparency of its parts to these rays, while an ordinary photograph records the reflection of ordinary light from the surface of objects. Fig. 101 shows the manner in which photographs are made with Roentgen rays.

The Crookes tube, T, is supported in any con-

venient manner, as a stand, S; the primary of the induction coil, D, is connected to three or four

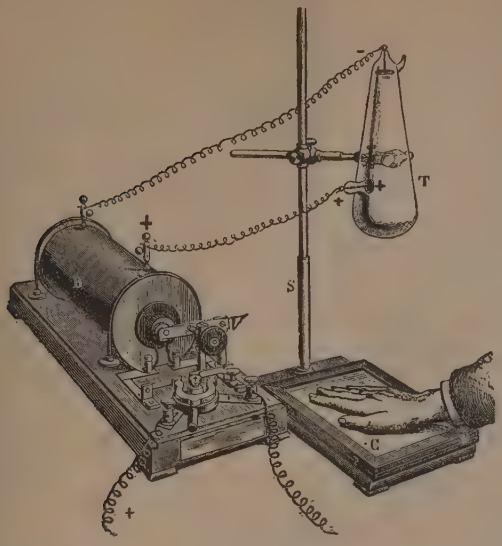


Fig. 101.

good primary or secondary cells. The secondary terminals of the coil are connected with a Crookes tube, the negative terminal of the coil being connected with the cathode of the tube. The dry plate is inclosed in a light-tight case or holder, C, which is placed directly below the tube, and the hand or other object to be photographed is placed on the holder, as shown. When the circuit is made through the primary of the coil, the automatic vibrator, V, interrupts the current several times per second, and the secondary of the coil discharges through the tube at each interruption. The tube emits a pale greenish yellow light where the cathode rays strike, but the fluorescent light is not to be confused with the Roentgen rays, which are invisible. The time of exposure depends upon the thickness or density of the body to be photographed and the intensity of the radiation, which depends largely on the character of the tube and the current sent through

Fig. 102.

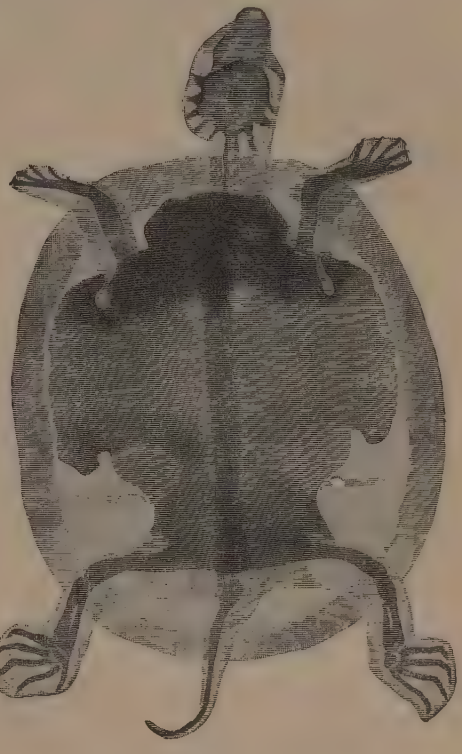


Fig. 103.

it. Slow plates appear to be about as sensitive as quick ones.

Figs. 102 and 103 show photographs taken in this manner. While the whole scientific world has, to a great extent, been interested in this discovery, and many of the ablest investigators have attempted to solve this intensely fascinating problem, very little has been added to our knowledge as to the true nature of the Roentgen rays.

Lenard's cathode rays in air must have been in part at least, Roentgen rays, since the condition under which he worked and the tests applied

would produce and detect Roentgen rays. Whether or not Lenard's rays and Roentgen's are different modifications of the same thing remains to be determined.

It has been conclusively demonstrated that the source of the Roentgen rays is the first dense object the cathode rays strike. In the vacuum this object need not be the wall of the tube, but may be any solid placed in the path of the cathode streams. Advantage is taken of this fact in constructing tubes for photographic work. If very powerful streams are directed against the glass, it becomes heated and breaks down. A piece of platinum placed in the path, since it can withstand great heat, permits of a concentration of the cathode rays, hence a powerful source of Roentgen rays.

Fig. 104 is a Crookes tube constructed on this principle; these are called focus tubes, but it is to be understood that there is no focusing of the Roentgen rays. The concave cathode, M, concentrates the cathode rays upon the piece of platinum, M′; here the cathode rays are totally or in part changed into Roentgen rays, which radiate in all directions from the front of the platinum plate. One advantage in this form is, that the rays, coming from a small source, produce sharp photographs or shadows on the fluorescent screen.

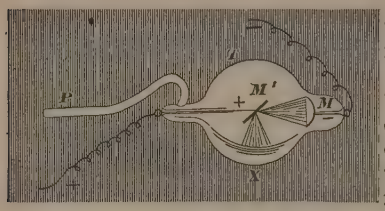


Fig. 104.

Many of the properties of Roentgen rays lead us to believe that the radiation consists of short waves in the ether, shorter than the waves of violet light; other properties indicate a long wave-length, longer than the waves of red light. Roentgen suggests that they are longitudinal waves in the ether, while others insist that it is not a wave-motion at all, though the latter view has few adherents.

The solution of the problem is looked forward to with great interest, both by the scientific and unscientific world.

§ 97. Primary Cells. A *primary* or *voltaic* cell is a device for producing electrical energy in the form of a continuous current at the expense of chemical energy. It consists usually of two plates immersed in an electrolyte. (See Electrolysis, in these Supplements). The electrolyte combines chemically with at least one of the plates, and when the combination is complete the electrical action ceases. Such a cell is termed a primary cell. If, however, after the chemical combination is complete, the resulting substances may be decomposed by an electric current, and thus put back into the original form, the cell is called a secondary cell, which is but another name for accumulator or storage-cell. (See Secondary Cells, § 109).

§ 98. Typical Voltaic Cell. If a strip of amalgamated zinc and one of pure copper be immersed in dilute sulphuric acid, it constitutes the simplest and the typical voltaic cell. (See Fig. 105.) When the plates are placed in the acid, bubbles of hydrogen collect on the zinc, but the chemical action soon ceases. If, however, the plates are connected by a conductor, a current will flow around the circuit, flowing from zinc to copper through the acid, and from copper to zinc in the conductor. The acid attacks the zinc, forming zinc sulphate, while hydrogen is freely liberated, and collects at the surface of the copper plate. For each unit of electricity that flows around the surface one electro-chemical equivalent of zinc and sulphuric acid disappears, and equivalent amounts of zinc sulphate and hydrogen are formed. The E.M.F. has already been defined as the work done by unit quantity of electricity in passing entirely around the circuit, and it is interesting to note that the E.M.F. can be predicted from the principle of conservation of energy; for the work done by the current appears as heat in the circuit, which we have seen is I^2R, where I is the strength of current and R the resistance of the circuit. It is also known that when a current flows across the juncture of two conductors, heat is developed; hence in a simple cell the heat appears in three quantities, as follows: That developed in the outside circuit of resistance, R; that developed in the cell, due to the internal resistance of the cell, r; and that developed at the juncture, which can be represented by H. Then if a current, I, flows for a time, t, the number of units of electricity that have passed around the circuit in the time is It. If e is the electro-chemical equivalent of zinc (the amount of zinc that combines with sulphuric acid to produce unit quantity of electricity (see Electrolysis, in these Supplements), Ite is the number of grams of zinc consumed in the time, t. If W is the work-equivalent of the heat produced when one gram of zinc combines with sulphuric acid to produce zinc sulphate, then the work-equivalent of the heat which would be developed by the chemical action of the cell in the time, t, is $IteW$, which must be equal to the heat developed by the current. Hence we may write

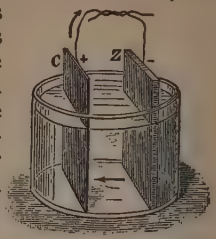


Fig. 105.

$$I^2Rt + I^2rt + HIt = IteW,$$

$$\text{or } I(R+r) = eW - H,$$

$$\text{and } I = \frac{eW - H}{(R+r)};$$

therefore $eW - H$ is the E.M.F. of the cell. The simple form of cell does not give a constant E.M.F., as some of the hydrogen produced adheres to the copper plate, forming a gaseous film, which increases the resistance of the cell, and also acts as a reverse E.M.F. The copper plate in this condition is said to be *polarized*, and is the seat of a reverse E.M.F. which reduces the theoretical E.M.F. in value. The reverse E.M.F. may be explained in the following manner: The hydrogen follows the current, and

its atoms carry positive charges; these, arriving at the copper plate, are prevented from coming in contact at once with the plate by the film of gas already there. The layer of atoms in this condition may be considered to form one plate of a condenser and the copper plate the other, and this condenser tends to discharge around through the liquid in the reverse direction to that in which the current flows.

Polarization is usually prevented by chemical means. In the Daniell cell and similar cells, the hydrogen is utilized in the action of the cell; in other cases, substances are placed in the cell, which combine with the hydrogen or oxidize as soon as formed. Many different primary cells have been devised, but since they are all modifications of a few principal forms, which may be taken as types, the latter only will be described.

§ 99. The Daniell Cell. The Daniell cell is one of the oldest and best known, and may be taken as the type of all cells in which zinc and copper and copper sulphate are used. In the Daniell cell (Fig. 106) the plates are zinc and copper. The zinc rod, Z, is placed in a porous cup, P, with dilute sulphuric acid, but later the liquid in the porous cup becomes zinc sulphate. The copper plate, C, surrounds the porous cup; the space between the cup and jar is filled with a saturated solution of copper sulphate, with crystals of the same salt to replace that in solution as fast as it used up in the action of the cell.

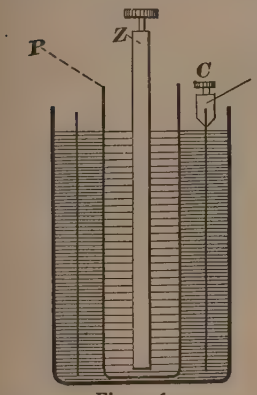


Fig. 106.

The sulphuric acid acting upon the zinc forms zinc sulphate and free hydrogen; the hydrogen, traveling with the current, passes through the porous cup to the copper sulphate, with which it combines, forming sulphuric acid, and setting free pure copper, which also travels with the current, and is deposited on the copper plate. The hydrogen, which ordinarily is detrimental to the action of the cell, becomes useful in keeping up the supply of acid to act upon the zinc. The cell may be set up with the zinc sulphate solution in the cup, instead of dilute acid. Since the copper sulphate is heavier than the zinc sulphate, the solutions are often kept separate by the action of gravity, the copper plate and copper sulphate being in the bottom of the jar, while the zinc and zinc sulphate are at the top (see Fig. 107). Such cells are called gravity cells. The solutions are also sometimes kept separate by a porous cup, which extends but half way down the jar, the bottom of the cup forming the partition.

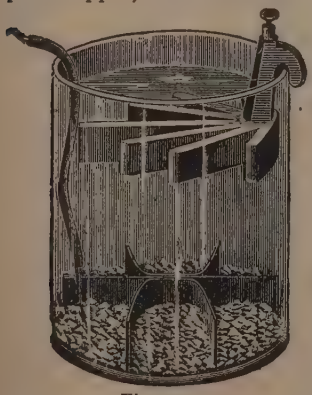


Fig. 107.

§ 100. Calculation of the E.M.F. of a Daniell Cell. When one electrochemical equivalent of zinc sulphate is formed at the zinc plate, one electrochemical equivalent of sulphuric acid disappears; but at the copper plate one electrochemical equivalent of sulphuric acid is formed, and one electro-chemical equivalent of copper sulphate disappears. Hence the source of electrical energy is the chemical energy lost when the copper in the copper sulphate is replaced by zinc, which is equivalent to the difference between the heat developed when zinc dissolves in sulphuric acid and that developed when an equivalent amount of copper dissolves in sulphuric acid. When one gram of zinc dissolves in sulphuric acid the heat developed is 1670 thermal units, or $1670 \times 4.2 \times 10^7$ work-units, 4.2×10^7 being the work-equivalent of one thermal unit, or the mechanical equivalent of heat. The electro-chemical equivalent of zinc is 0.003364 grams; hence the heat developed when one electrochemical equivalent of zinc is dissolved in sulphuric acid is $0.003364 \times 1670 \times 4.2 \times 10^7 = 2.359 \times 10^8$ work-units. When one gram of copper is dissolved in sulphuric acid, 909.5 thermal units are developed, which are equivalent to $909.5 \times 4.2 \times 10^7$ work-units. The electrochemical equivalent of copper is 0.003261, hence the heat developed when one electro-chemical equivalent of copper is dissolved is $0.003261 \times 909.5 \times 4.2 \times 10^7 = 1.245 \times 10^8$ work units.

The difference between these two quantities, 1.114×10^8, must represent the work done by one unit of electricity in going around the circuit, or the E.M.F. of the cell. The E.M.F. of a Daniell cell is found to be approximately 1.028×10^8; the difference between this and the calculated result is insignificant, and is probably due to the quantity of heat, H, of § 98.

§ 101. Grove's Cell. Grove's cell is a zinc-platinum cell; the zinc is acted upon by sulphuric acid, while the platinum is placed in a porous cup containing strong nitric acid, which oxidizes the hydrogen and prevents polarization. Since there is no chemical action upon the platinum, the electromotive force is high, being approximately 1.9 volts.

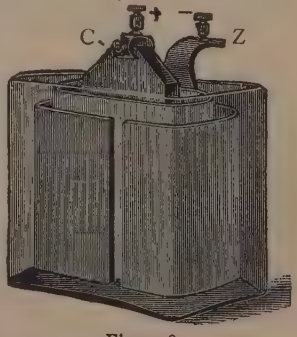


Fig. 108.

§ 102. Bunsen's Cell. The Bunsen cell (Fig. 108) is like the Grove, except that the platinum is replaced by hard carbon, which, of course, is more economical. The cell may be modified by placing the zinc and

sulphuric acid in the porous cup, and the carbon (several rods of electric-light carbon will answer) outside the cup in a saturated solution of potassium nitrate acidulated with one tenth its volume of strong sulphuric acid; sodium or ammonium nitrate may be used in place of the potassium salt.

§ 103. Bichromate or Grenet's Cell. A Bunsen cell without the porous cup, and in which bichromate of potassium or sodium is added to the sulphuric acid as a depolarizer, becomes a Grenet cell. The bichromate in the presence of sulphuric acid forms chromic acid, which gives up its oxygen readily to the free hydrogen.

The sodium salt is to be preferred, since it is more soluble. Fig. 109 is a common form of the bichromate cell, in which the zinc plate can be raised when the cell is not in use. In this and other forms of the cells where the zinc is in an acid solution, it should be amalgamated; commercial zinc contains impurities which form local closed circuits in the plate itself, when placed in the acid. These cause a wasting away of the zinc and add nothing to the E.M.F. of the cell. The zinc is amalgamated by cleaning it in sulphuric acid and rubbing mercury over its surface; the mercury readily forms an alloy with the zinc, dissolving the pure zinc only; hence the acid is in contact with the amalgam or pure zinc dissolved in mercury.

Fig. 109.

§ 104. The Leclanché Cell. The Leclanché cell (Fig. 110) may be taken as a type of a large number of cells, in which the zinc and carbon are used as the plates, and a strong solution of ammonium chloride as the electrolyte. The carbon is packed in a porous cup with granulated manganese dioxide and carbon; the granulated carbon is added to decrease the resistance of the cell, and the manganese dioxide serves as a depolarizer. This, however, acts slowly; hence, if the current is kept closed, these cells polarize in a few minutes, but rapidly recover when the circuit is opened. The chemical action practically ceases when the circuit is opened; hence this class of cells is well suited for all kinds of light intermittent work, such as door-bells, signals, etc. The cells are often made portable by replacing the glass jar with a zinc cup, which serves also as the zinc plate; the electrolyte is made into a stiff paste by adding dextrine, starch, chloride of lime and other ingredients; it is then known as a *dry cell*. When the circuit is closed in this class of cells, the zinc displaces the ammonium from the ammonium chloride, forming zinc chloride. The ammonium breaks up into ammonia and hydrogen; the former is dissolved by the liquid of the cell, or escapes when the cell is worked hard, while the hydrogen is oxidized by the manganese dioxide. In a number of these cells the porous cup is omitted, the manganese dioxide being incorporated in the carbon plate or omitted altogether.

Fig. 110.

§ 105. Copper Oxide Cell. The copper oxide cell was invented by Lalande and Chaperon. A zinc spiral or plate is immersed in a strong solution of caustic potash or soda, containing thirty to forty parts of alkali to one hundred parts of water. The positive plate is either copper or iron, in contact with copper oxide. The zinc replaces hydrogen in the alkali, forming sodium zincate (Na_2ZnO_2); the hydrogen, following the current, takes oxygen from the copper oxide, leaving metallic copper. Fig. 111 is a common form of the copper oxide cell, known as the Edison-Lalande cell. The copper oxide is in the form of a compressed plate held in a copper frame, C. A layer of paraffin oil, O, is placed on the solution of caustic potash to prevent the absorption of carbon dioxide from the air. The cell has a very low internal resistance, about 0.03 of an ohm; hence it is capable of giving a large current. The E.M.F. is only 0.7 volts.

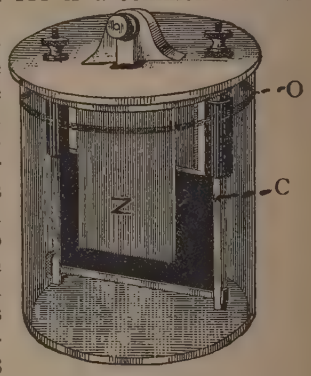


Fig. 111.

§ 106. Silver Chloride Cell. In a silver chloride cell the elements are zinc and silver; silver chloride is cast on the silver, which acts as a depolarizer. The electrolyte is dilute ammonium chloride containing 23 grams of the salt to one liter of water; a denser solution dissolves the silver chloride. The cell polarizes but slightly and recovers quickly, but can be used for small currents only.

§ 107. Clark's Standard Cell. The Clark standard cell, one form of which is shown in Fig. 111, has for its negative electrode pure zinc (or a ten-per-cent amalgam) in a neutral saturated solution of zinc sulphate, with an excess of the zinc sulphate crystals. The positive electrode is pure mercury in contact with a paste of mercurous sulphate. In the form shown, due to Carhart, the zinc sulphate solution and the paste are kept from mixing by a layer of asbestos. When

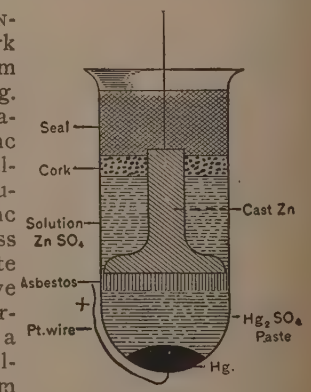


Fig. 112.

this cell is carefully prepared from pure materials, the E.M.F. is constant, and is 1.434 volts at 15° C. It diminishes by about 0.001 volt per degree rise in temperature between 10° and 25° C. The cell has been adopted as the international standard of E.M.F. Helmholtz suggested the substitution of the chlorides of zinc and mercury for their sulphates. The E.M.F. is then lower, and may be made exactly one volt by adjusting the density of the zinc chloride solution. Cadmium and cadmium sulphate have been substituted for the zinc and zinc sulphate; the E.M.F. is then nearly one volt, and the variation with temperature is small.

§ 108. Data Relating to Primary Cells.

Cell.	Negative Electrode.	Excitant.	Depolarizer.	Positive Electrode.	Approximate Volts.
Daniell	Zinc	$ZnSO_4 + aq.$	$CuSO_4 + aq.$	Copper	1.1
Bunsen	Zinc	$H_2SO_4 + aq.$	HNO_3	Carbon	1.9
Grove	Zinc	$H_2SO_4 + aq.$	HNO_3	Platinum	1.9
Bunsen	Zinc	$H_2SO_4 + aq.$	$NaNO_3 + H_2SO_4$	Carbon	1.8
Bichromate	Zinc	$H_2SO_4 + aq.$	$Na_2Cr_2O_7 + H_2SO_4$	Carbon	1.9
Leclanché	Zinc	$NH_4Cl + aq.$	MnO_2	Carbon	1.5
Lalande	Zinc	$NaOH$	CuO	Copper	0.8
Silver chloride	Zinc	$NH_4Cl + aq.$	$AgCl$	Silver	1.1
Clark	Zinc	$ZnSO_4 + aq.$	Hg_2SO_4	Mercury	1.434
Calomel	Zinc	$ZnCl_2 + aq.$	Hg_2Cl_2	Mercury	1.0
Weston	Cadmium	$CdSO_4 + aq.$	Hg_2SO_4	Mercury	1.022

§ 109. Secondary Cells, or Accumulators. If two pieces of platinum, A and B (Fig. 113), are immersed in dilute sulphuric acid, and an electric current sent through the cell in the direction indicated, oxygen and hydrogen are liberated, oxygen collecting at the plate, A, or anode, and hydrogen at B, the cathode (see Electrolysis, in these Supplements). Electrical energy has been used up in separating the oxygen and hydrogen, and they possess a certain amount of chemical energy because of this separation. If, now, the source of current be removed, and the wires leading from A and B are connected through a galvanometer, it shows a deflection, and indicates a current in the *reverse direction;* for since the E.M.F., which was applied to produce the separation, has been removed, the oxygen and hydrogen are free to combine, which they do under these conditions, and give back the chemical energy in the form of electrical energy.

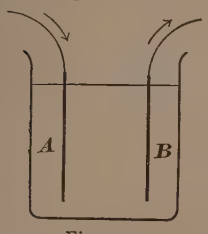


Fig. 113.

Grove constructed a gas battery working upon this principle. The action just described may be taken as the type of all *secondary batteries*, *accumulators*, or *storage-batteries*; but it is to be noted that they do not store electrical, but chemical, energy, the only difference between a primary and secondary battery cell being that in the former the active materials are taken from some outside source, and brought together under the proper conditions, and in uniting they produce a current; but in the secondary cell the active materials are prepared in the cell by means of a current sent through it. When the current is continued, the materials revert to their original state, and during this process the secondary cell is precisely the same as the primary cell. While the fact that a reverse current could be obtained in the case of oxygen and hydrogen under the conditions stated was known as early as 1803, it was not until 1860 that Planté discovered the exceptional efficiency of lead for this purpose, and constructed the first secondary batteries which were commercially useful.

Planté's cell consisted of two large sheets of lead rolled up together, but without metallic contact, and immersed in dilute sulphuric acid. To "form" or prepare the lead, a current is sent through the cell; the oxygen liberated at the anode oxidizes the lead, forming a dark brown coating of peroxide of lead. The cell is then discharged and a current is sent through in the reverse direction, coating the other plate with peroxide, while the hydrogen which collects at the plate first coated reduces the peroxide on it to metallic lead again, but leaving it in a finely divided state. The current is reversed several times in this manner until the plates are covered with a coating of finely divided lead. The cell is finally charged by sending a current through it until the electrolyte begins to be decomposed, showing that the action is complete; it will remain in this condition for many days, and will furnish current until the two plates are reduced to a chemically inactive state. The E.M.F. of the cell is approximately two volts. Faure, in 1881, modified the Planté cell by supplying the two plates with a coating of active material. The plates are cast or rolled in the form of grids, the holes or spaces being filled with the lead oxides which compose the active material, thus dispensing with the tedious and expensive process of forming. During the operation of charging, the oxides are changed to the peroxide at the anode or positive plate, and spongy lead at the cathode or negative plate. The chemical reactions of the cells are not thoroughly understood; sulphuric acid is formed during the charging and disappears when the cell is discharged. An almost endless variety of storage-cells have been devised, but they are generally some modification of one or the other of the two types described.

A commercial form of the Planté cell is shown in Fig. 114. Fig. 115 shows a section of the lead plates, which are grooved in order that they may present as much surface as possible. The active material is formed on the surface of the plates by an electrochemical process which greatly reduces the time and expense of forming.

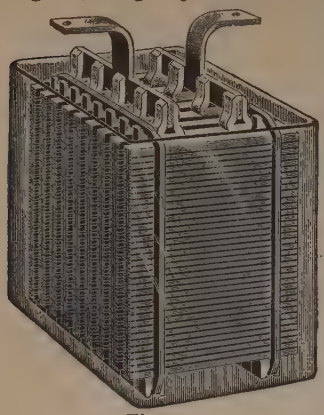


Fig. 114.

Fig. 116 is a common form of cell known as the chloride accumulator. The elements are made of half-tablets or pastilles of a salt of lead, inclosed in a dense frame of metal cast around them under heavy pressure; this plate of lead-salt so framed is then reduced electro-chemically to pure metallic lead. This gives a plate entirely composed of metallic lead, partly in compact form, partly in minute crystalline subdivision, differing only from a plate of cast or rolled lead in that some of its parts are of a granular character. The plates to be oxidized are then put, with alternate lead plates, in an electrolytic cell, and a current is passed through them for a sufficient time to convert the pure crystalline metallic lead into peroxide of lead.

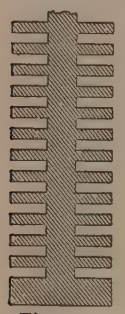


Fig. 115.

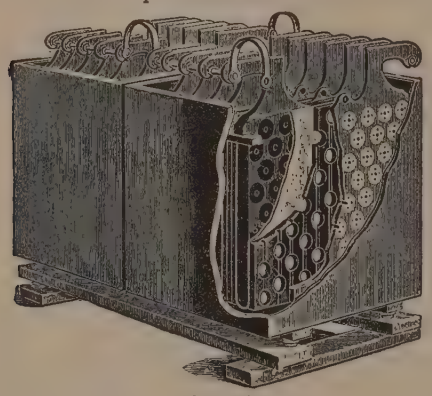


Fig. 116.

In cells of the Faure type the plates are cast full of square holes, the holes in the positive plate being filled with a stiff paste, prepared by mixing red lead (Pb_3O_4) with dilute sulphuric acid. This hardens as it dries, and during the process of charging it is partly changed to the peroxide. The paste for the negative plates is made of yellow lead, or litharge (PbO) and dilute sulphuric acid, which is covered with spongy metallic lead when the cell is charged. The voltage of both types is approximately the same.

Secondary batteries are usually rated at a certain number of ampere-hours. A 150-ampere cell should provide a current of 15 amperes for 10 hours, or one ampere for 150 hours. There is a limit, however, to both the charging and discharging rate, for if the current in either case is too great, the cell is not efficient. A change in the nature of the active material causes, also, a change in its volume; hence if the change in volume takes place too rapidly, the active material crumbles and falls off the plate. Secondary cells have, in general, a high electromotive force and low internal resistance, and hence are better suited to give large currents than primary cells; they give back from 70 per cent to 85 per cent of the energy used in charging. For many purposes they possess the disadvantage of great weight, and many attempts have been made to replace the lead by some lighter material, but as yet none have been entirely successful. The negative plate has been, in some cases, replaced by a zinc plate, well amalgamated; the solution used is dilute sulphuric acid containing zinc sulphate. On charging, zinc is deposited electrolytically on the zinc plate, while the action on the positive plate is the same as in other cells. The voltage is somewhat higher, being 2.5 volts; but the chief defect in the cell is its tendency to local action, necessitating the keeping of the zinc plate well amalgamated.

§ 110. Electrical Units. An absolute system of electrical units is one in which the units are independent of any arbitrary quantities, other than the fundamental units of mass, length and time. Two such systems are in use, and since they both take the centimeter, the gram and the second as the units of length, mass and time, they are called "centimeter-gram-second" systems, or, briefly, C.G.S. systems. The units of these systems have no special names, and are convenient only for mathematical investigation, being, in most cases, too large or too small for practical use.

The first of these systems is built up from the phenomenon of attraction between two charged bodies, and is called the *electrostatic system.* Unit-charge, or quantity of electrification, in this system has already been defined (§ 13). The second system depends upon the magnetic field about a conductor carrying a current (§ 50), and is therefore called the *electromagnetic system* of units.

Electrostatic Units.

Unit Quantity. The unit of quantity is that quantity of electricity which, when placed at a distance of one centimeter (in air) from a similar and equal quantity, repels it with a force of one *dyne* (§ 13).

Unit Potential. Potential being measured by *work* done in moving a unit of positive electricity against the electric forces, the unit of potential will be measured by the unit of work, the *erg.*

Unit Difference of Potential. Unit difference of potential exists between two points when it requires the expenditure of one *erg* of work to

bring a positive unit of electricity from one point to the other against the electric force (§ 25).

Unit Capacity. A conductor has unit capacity when it requires a charge of one unit of electricity to bring it up to unit potential. A sphere of one centimeter radius possesses unit capacity (§ 31).

Specific Inductive Capacity. This is defined in § 36 as the ratio between two quantities of electricity. The specific inductive capacity of air is taken as unity.

Electromagnetic Units.

Unit Magnet-Pole. Unit magnet-pole is one of such strength that, when placed at a distance of one centimeter (in air) from a similar pole of equal strength, repels it with a force of one *dyne*.

Unit-Strength of Current. A current has unit-strength when one centimeter length of its circuit, bent into an arc of one centimeter radius (so as to be always one centimeter away from the magnet-pole), exerts a force of one *dyne* on a unit magnet-pole placed at the center (§ 50).

Unit Quantity of Electricity is that quantity which is conveyed by unit-current in one second.

Unit Difference of Potential (or E.M.F.). Potential is work done on a unit of electricity, hence unit difference of potential exists between two points when it requires expenditure of one *erg* of work to bring a unit of positive electricity from one point to the other against the electric force.

Unit Capacity. A conductor of unit capacity requires unit quantity to charge it to unit potential.

Unit Induction. Unit induction is such that unit E.M.F. is introduced by the variation of the current at the rate of one unit of current per second.

Practical Units and Standards.

The practical units are derived by taking convenient multiples of the units in the C.G.S. electromagnetic system.

A *Standard* is a quantity of the same kind as that to be measured, and with which comparisons are actually made. A standard is conveniently a unit, but not necessarily so; for example, the standard of E.M.F. is that of a Clark cell, but this is known to be 1.434 practical units, or volts.

Resistance. The *Ohm* $= 10^{9}$ absolute electromagnetic units, and is represented by the resistance offered to an unvarying electric current by a column of mercury at 0° C., 14.4521 grams in mass, of a constant cross-sectional area, and a length of 106.3 centimeters.

Current. The *Ampere* $= 10^{-1}$ absolute electromagnetic units, and is represented by the current which deposits silver at the rate of 0.001118 grams per second.

Electromotive Force. The *Volt* $= 10^{8}$ absolute electromagnetic units, and is that E.M.F. which, applied to one ohm, will produce in it a current of one ampere; being $\frac{1000}{1434}$ of the E.M.F. of a Clark standard cell at 15° C.

Quantity. The *Coulomb* $= 10^{-1}$ absolute electromagnetic units of quantity, being the quantity of electricity conveyed by one ampere in one second.

Capacity. The *Farad* $= 10^{-9}$ (or one thousand-millionth) absolute electromagnetic units of capacity, being the capacity of a condenser such as to be charged to a potential of one volt by one coulomb. The *microfarad* (or millionth part of one farad) $= 10^{-15}$ absolute units.

Induction. The *Henry* $= 10^{9}$ absolute electromagnetic units of induction, is the induction in a circuit when the E.M.F. induced in this circuit is one volt, while the inducing current varies at the rate of one ampere per second.

The prefixes *mega-* and *micro-*, when used in connection with the above units, signify, respectively, "one million" and "one millionth" part. Thus a *megohm* is a resistance of one million ohms and a *microfarad* is one millionth of a farad. The prefix *kilo* is used for "one thousand," and *milli* for "one thousandth" part.

The following units of work and power are used in connection with the practical units:

Work. The *Joule* $= 10^{7}$ ergs. It is represented by the energy expended per second by one ampere in one ohm.

Power. The *Watt* $= 10^{7}$ ergs per second; it is equivalent to the power of a current of one ampere due to an E.M.F. of one volt, or one joule per second; approximately, $\frac{1}{746}$ of a horse-power.

S. W. STRATTON.

INDEX.

Accumulators, or Secondary Cells, § 109.
Alternating Currents, § 86; Electrodynamic Action between, § 90.
Armature Drum, § 91; Ring, § 80.
Bichromate or Grenet's Cell, § 103.
Bunsen's Cell, § 102.
Choking Coil, § 78.
Circuit, Magnetic, § 63.
Clark's Standard Cell, § 107.
Condensers, § 34; in Parallel and Series, § 35.
Conductivity, § 44.
Conductors and Insulators, § 6.
Conductors and Non-Conductors, §§ 10, 11; Capacity of a Conductor, § 30; Energy Expended in Charging a Conductor, § 29; Force or Unit-Area of a Charged Conductor, § 22; Intensity at the Surface of a Charged Conductor, § 21; Resistance of Conductors placed in Parallel, § 46; Resistance of Conductors placed in Series, § 45.
Constant-Current Machines, § 83.
Constant-Potential Machines, § 84.
Continuous Potential Difference, § 39.
Copper Oxide Cell, § 105.
Currents, § 38; Action of Currents upon Each Other, § 54; Strength of Current, § 41; Unit Current, § 50.
Daniell Cell, § 99; Calculation of E.M.F. of, § 100.
Density, Surface, § 15.
Discharge, § 14; at High Potential, § 94; In High Vacua (Cathode Rays), § 95.
Dynamos, § 79; Alternating Current, § 85.
Electrical Units, § 110.
Electric and Dielectric, § 7.
Electricity Defined, § 1.
Electrification, § 2; Both Kinds Always Produced, § 5; By Induction or Influence, § 12; Other Sources of, § 4; Two Kinds of, § 3.
Electromagnet, Poles of an, § 67.
Electromotive Force, § 40; Direction of the Induced Electromotive, § 69; Value of the Induced Electromotive, § 70.

Electrophorous, § 12a.
Equipotential Surfaces, § 26.
Field, § 8; Directions and Intensity of the Electromagnetic, § 47; Effect of Iron in the, § 56; Effect of the Dielectric on the Intensity of the, § 37; Intensity of the Electric, § 16; Intensity of, at the Center of a Circle, § 49; Representation of, by Lines and Tubes of Force, § 9; Representation of the Electromagnetic Field by Lines of Force, § 48; Rotary Magnetic, § 89.
Field-Magnets, § 82.
Force between Charged Bodies, § 17.
Galvanometers, § 51; Suspended Coil, § 53; Suspended Needle, § 52.
Gauss's Theorem, § 19.
Grove's Cell, § 101.
Hysteresis, § 62.
Induced Current, Value of, § 73.
Induced Electromotive Force, Value of, § 70.
Induction Coils, § 74; Tesla's, § 75.
Induction, Mutual, § 71.
Induction or Influence, Electrification by, § 12.
Induction over a Surface, Total Normal, § 18.
Intensity, § 20; at the Surface of a Charged Conductor, § 21; of the Field, Effect of the Dielectric on the, § 37; Electromagnetic Intensity, § 55; of the Electric Field, § 16; of the Field at the Center of a Circle, § 49; Relation between E.M.F. Intensity of Current and Resistance, § 42.
Insulators and Conductors, § 6.
Leclanché Cell, § 104.
Magnetic Circuit, Law of, § 66.
Magnetic Properties, Methods of Representing, § 61.
Magnetic Susceptibility, § 58.
Magnetomotive Force, § 65.
Motion in an Electromagnetic System, § 68.
Oscillatory Electric Discharge, § 92.
Parallel Plates, Cases of Two, § 33.
Paramagnetic and Diamagnetic Substances, § 60.
Permeability, § 57.
Poles of an Electromagnetic, § 67.
Polyphase Currents, § 88.
Potential, § 23; Due to a Charged Sphere, § 27; of a Charged Conductor, § 28; Difference of, between Two Points, § 25.
Primary Cells, § 97; Data Relating to Primary, § 108.
Resistance of Conductors in Series, § 45; of Conductors Placed in Parallel, § 46; Energy Expended by the Current in Overcoming, § 43.
Relation between μ and k, § 59.
Reluctance, § 64.
Resonance, § 92.
Roentgen Rays and Photography, § 96.
Secondary Cells, or Accumulators, § 109.
Self-Induction, § 72.
Silver Chloride Cell, § 106.
Specific Inductive Capacity, § 36.
Spheres, Capacity of, § 31; Capacity of Two Concentric, § 32; Potential Due to a Charged Sphere, § 27.
Tesla's Induction Coil, § 75.
Transformers, § 76; Rotary, § 77.
Tubes of Force, § 9a; Representation of the Electric Field by Lines and, § 9.
Unit-Charge, § 13.
Voltaic Cell, § 98.
Volts and Amperes, § 87.
Waves, § 93.
Wimshurst Influence-Machine, § 12b.
Zero-Potential, Point of, § 24.

ELECTRICITY, ANIMAL. See ANIMAL ELECTRICITY, in these Supplements.

ELECTRIC LIGHTING. See LIGHTING, ELECTRIC, Vol. XIV, pp. 630 et seq.

ELECTRIC METERS. See *Voltameters*, under ELECTROLYSIS, Vol. VIII, pp. 107, 108.

ELECTRIC MOTORS. See MOTORS, in these Supplements.

ELECTRIC RISKS. See FIRE INSURANCE, in these Supplements.

ELECTRIC STORAGE-BATTERY. See ELECTRICITY, § 109, in these Supplements.

ELECTRIC WAVES. See ELECTRICITY, § 93, in these Supplements.

ELECTRIFICATION. See ELECTRICITY, §§ 2–5, 12, in these Supplements.

ELECTROCHEMICAL ORDER OF THE ELEMENTS. The following table will show the electric order of the majority of the elements which are acted upon by gases and liquids, and from which electricity can be generated. It is graduated from the electropositive to the electronegative.

Electropositive.	Tin.	Tungsten.
Potassium.	Bismuth.	Molybdenum.
Sodium.	Copper.	Vanadium.
Lithium.	Silver.	Chromium.
Barium.	Mercury.	Arsenic.
Strontium	Palladium.	Phosphorus.
Calcium.	Platinum.	Iodine.
Magnesium.	Gold.	Bromine.
Aluminium.	Hydrogen.	Chlorine.
Uranium.	Silicon.	Fluorine.
Manganese.	Titanium.	Nitrogen.
Nickel.	Tellurium.	Selenium.
Cobalt.	Antimony.	Sulphur.
Cadmium.	Carbon.	Oxygen.
Lead.	Boron.	*Electronegative.*

ELECTROCUTION. See CAPITAL PUNISHMENT, in these Supplements.

ELECTRODYNAMIC ACTION. See ELECTRICITY, Vol. VIII, pp. 10, 66; and ELECTRICITY, § 90, in these Supplements.

*ELECTROLYSIS. While many new facts have been learned about electrolysis, or the decomposition of chemical substances by the agency of the electric current, the chief material additions to our knowledge of the subject have lain in the interpretation of the facts already known, and in the confirmation of the new theories. Electrolysis takes place when a current of electricity is passed through a fused substance, or a solution in water, and the latter is by far the more usual method. A very clear account of the phenomena is given in the main article (Vol. VIII, p. 106), but the conflicting nature of the views held in regard to them is made equally plain. The difficulty lay in our ignorance of the condition of the substance in solution, and of the nature of the process of solution in the case of acids, bases and salts, which are the only bodies whose solutions show electrolytic conduction.

The distinction between conductors, like copper and iron, which remain unchanged by the passage of the current, and solutions in which decomposition takes place, and the constituents are set free partly at one pole, and partly at the other, leads to the perfectly correct idea that the latter process is in some sense a transportation of the electricity with the substance, rather than a simple conduction through it. Thus when a current of electricity passes through a solution of hydrochloric acid, hydrogen is set free at the negative pole, and chlorine at the positive. It is found that the amount of each set free is proportional to the quantity of electricity passing round the circuit. It seems, at first sight, plain that the compound has been torn apart by the electricity. But this is inconsistent with the observation that the weakest current is capable of

*Copyright, 1897, by The Werner Company.

producing some decomposition, and that the resistance is comparable with that of ordinary conductors. These facts can only be explained on the assumption that the current finds the decomposition already effected, and merely performs the function of guiding the fragments to the electrodes. The question which remained to be settled was, whether this decomposition affected a large proportion of the salt, or whether only a small quantity was at any one time in a position to yield to the influence of the current.

It was Van t'Hoff's proof that acids, bases and salts are at all times largely dissociated (see CHEMISTRY, in these Supplements) that decided the question, and led Arrhenius to the statement of the theory of electrolytic dissociation as an explanation of all the hitherto unexplained peculiarities of the phenomena of solution. According to this theory, the act of solution of all substances of the above classes in water brings about their dissociation into the ions, to a greater or less degree. The ions 2H & SO^4 from H^2SO^4, H & Cl from HCl, Na & Cl from NaCl, K&NO^3 from KNO^3, K&OH from KOH, and so forth, behave as independent molecules as far as the physical properties of the solutions go. They are not particles of free K, Na, etc., and so do not act chemically, as these substances would do. They are possessed of large charges of electricity. It is only when they have been led to one of the poles, and their electricity has been discharged, that they assume the properties of the free elements. Hence we have no immediate evidence of their separate existence, excepting when a current is passing, and then only at the electrodes. Water is itself so poor a conductor that practically the current is all carried by the ions of the salts. It is true that frequently oxygen and hydrogen are given off, and the action seems to have been a decomposition of water. This is the case in the familiar electrolysis of dilute sulphuric acid. The substances really set free are 2H and SO^4; but the latter, not being a substance capable of independent existence, interacts with the water in the neighborhood: $2SO^4 + 2H^2O = 2H^2SO^4 + O^2$, and the result is the re-formation of sulphuric acid and the liberation of oxygen. That this is the real procedure is shown by the fact that sulphuric acid accumulates round the positive electrode. Such secondary reactions with water are, of course, very common. Thus from NaCl we get, primarily, Na and Cl; but only the latter appears in the free condition. The former interacts with the water, giving sodium hydroxide and hydrogen, $2Na + 2H^2O = 2NaOH + H^2$, and in this case the base accumulates round the negative electrode, and may be shown to be present by its action on red litmus.

It is evident that by this means important information can be gained in regard to the ions really present. Thus sodium platinic chloride, Na^2PtCl^6, cannot be a loose combination of the chlorides, but a compound giving the ions 2Na and $PtCl^6$, for the platinum appears along with the chlorine at the positive, and the sodium is set free at the negative wire. If the solution contained the ions 2Na, Pt, and 6Cl, both metals would appear at the negative end. Similarly, potassium ferricyanide separates as 3K and $Fe(CN)^6$. These facts are in entire accord with the chemical behavior of these and similar salts. On no other assumption can we explain the facts that $K^3Fe(CN)^6$ gives the ordinary tests for potassium, but not for iron; that potassium chromate, K^2CrO^4, does not give the ordinary test for chromium; and that potassium chlorate, $KClO^3$, and monochloracetic acid, $ClCH^2COOH$, give no precipitate of silver chloride on adding silver nitrate. In all those cases the tests are for the ions Fe, Cr, Cl, while the ions actually present are $Fe(CN)^6$, CrO^4, ClO^3, $ClCH^2COO$. Almost the whole of analytical chemistry is founded on reactions involving the interchange of ions. Thus on adding hydrochloric acid to silver nitrate, we get a precipitate of silver chloride by the union of the Ag and Cl ions, $\overset{+}{Ag} + \overset{+}{NO^3} + \overset{+}{H} + \overset{-}{Cl} = AgCl + \overset{+}{H} + \overset{-}{NO^3}$; the H and NO^3 ions remain in the solution. When silver nitrate is added to potassium chlorate no precipitate is produced, because the interchange of the ions can only form silver chlorate, which is soluble: $\overset{+}{Ag}\overset{-}{NO^3} + \overset{+}{K}\overset{-}{ClO^3} = \overset{+}{Ag}\overset{-}{ClO^3} + \overset{+}{K}\overset{-}{NO^3}$.

The electrolysis of solutions has been used industrially for many purposes. Thus copper now is extracted from its ores by bringing it into solution, depositing the copper electrolytically and using the exhausted liquid in the treatment of fresh quantities of the ore. A bleaching-solution, which is stated to be more active than ordinary bleaching-powder, is prepared by the electrolysis of calcium chloride dissolved in water: $CaCl^2 = Ca + Cl^2$. The calcium acts on the water, forming calcium hydroxide: $Ca + 2H^2O = Ca(OH)^2 + H^2$, and on mixing, the chlorine interacts with the base, forming bleaching-powder: $2Ca(OH)^2 + 2Cl^2 = Ca(ClO)^2 + CaCl^2 + 2H^2O$. Now that electrical power is very cheap in many localities, operations like this can be carried on profitably. A method of purifying sewage has been patented, in which salt-water is partially electrolyzed, and the chlorine set free acts as a disinfecting agent. In the field of organic chemistry it has been found that the hydrogen set free in electrolysis can be used for the reduction of nitrobenzene ($C^6H^5NO^2$) to amidophenol, and it is expected that this method will have a wide field in connection with the synthesis of bodies which have not hitherto been manufactured on a large scale, but for which technical uses exist. The manufacture of aluminium is now conducted commercially by the electrolysis of a solution of aluminium oxide in molten cryolite. (See ALUMINIUM, in these Supplements.)

When a solution containing two salts is electrolyzed, the results vary according to the character of the current used. Unless the current is very strong, both metals carrying it reach the electrode, but only the less oxidizable is deposited. Thus a mixture of salts of zinc and copper deposits, under these circumstances, only the latter. The zinc set free instantly precipitates an equivalent amount of copper, and goes itself into solution, just as it would do in the absence of a current. With a stronger current,

however, there is not time for this chemical change, and brass is deposited.

The character of the deposit of metal depends on the current density, so that, for practical purposes of electroplating, this has to be adjusted carefully, in order to prevent the deposit from being crystalline, or from being formed so fast that it adheres only loosely to the plate.

The use of an exact method for the measurement of the conductivity of electrolytes has cleared up many of the difficulties in understanding the phenomena of electrolysis. The conductivity varies with different salts. With all, it becomes greater relatively to the quantity of substance dissolved on diluting the solution. In every case a maximum is reached or approached. For strong acids and bases and their salts, this occurs on moderate dilution; for weaker acids and bases, it is approached and would be reached only at an infinite dilution. Since the electricity is carried by the ions, this means that dissociation increases with dilution, and is nearly complete for strong acids and bases and their salts, even at moderate dilution. Another factor besides the degree of dissociation enters into the conducting power of every salt; namely, the speeds with which the ions move. These vary within wide limits. Thus hydrogen ions move five times as fast as chlorine ions; hydroxyl ions, two and a half times as fast. If we know the speed of the ions of any salt, and the conductivity at several dilutions, we can calculate the degree of dissociation of the salt in question at each stage of dilution. This degree of dissociation is a magnitude of great importance to the chemist, for it measures the chemical activity of the substance. It is important, therefore, to notice independent evidence in our hands which confirms the value obtained by electrical methods, and so establishes more securely the theory of electrolytic dissociation in general,

In the first place, Ostwald measured the relative affinities of various acids for various bases, where two acids competed for a quantity of the base insufficient to neutralize both. The values agreed with the values for the dissociation of the same acids in solutions of equal strength. Other methods of measuring affinity gave similar results.

In the second place, as we have seen in speaking of solution (see CHEMISTRY, in these Supplements), the osmotic pressure is proportional to the number of particles present, whether they are molecules or ions. A measurement of osmotic pressure of various solutions has given the same figures for dissociation as the electric conductivity method.

In the third place, the lowering of the freezing-point and elevation of the boiling-point give a means of measuring the number of bodies acting as molecules. For salts, this number is always much larger than the quantity of complete molecules present would lead us to expect. Thus, in one experiment, 78 per cent of the potassium chloride was dissociated into K and Cl; in another, 79 per cent of barium chloride was dissociated into Ba, Cl and Cl, three ions arising out of each molecule.

Again, the color of the ion is often different from that of the molecule. Thus anhydrous cobalt chloride is blue. In dilute aqueous solution it is red, the color of the cobalt ion. In concentrated aqueous solution, or in alcoholic solution, therefore, where the dissociation is inconsiderable, the color is blue. On diluting the water solutions, the ionization increases, and the color passes through purple to red. Similarly, the solution of potassium cobalticyanide, $K^3Co(CN)^6$, is colorless, since the ions are $3K$ and $CO(CN)^6$, and cobalt ions are absent.

Finally, the heat of neutralization of dilute solutions of strong bases by strong acids is the same, whatever bases or acids are selected. Yet the heats of formations of the salts by other methods are very different. The only possible explanation, is that in neutralization the same heat is given out because the same substance is formed; in every case, water only. The action which takes place is represented by the equation:

$$\overset{+}{H} + \overset{-}{Cl} + \overset{+}{K} + \overset{-}{OH} = \overset{-}{Cl} + \overset{+}{K} + H^2O + 13700 \text{ cal.}$$

Water not being appreciably dissociated, its ions H and OH cannot exist in presence of each other, and they unite to form water. The other two ions remain unchanged, unless the solution is evaporated. The action of neutralization consists, therefore, not in the formation of the salt, but simply and solely of water, so that the heat of neutralization is constant for all strong acids and bases, because the action is always the same union of H and OH.

ALEX. SMITH.

ELECTROMAGNETISM. See ELECTRICITY, § 55, in these Supplements.

ELECTROMOTIVE FORCE. See ELECTRICITY, § 40, in these Supplements.

ELECTROMOTIVE FORCE, DIRECTION OF THE INDUCED. See ELECTRICITY, § 69, in these Supplements.

ELECTROMOTIVE, VALUE OF THE INDUCED. See ELECTRICITY, § 70, in these Supplements.

ELECTROMOTOGRAPH, a device of Thomas A. Edison's for obtaining a mechanical effect from a very minute electric force. He made use of it in a telephonic receiver to increase the sound. It is based upon the principle that a sheet of roughened paper, which has been dipped in certain solutions and dried, may be laid upon a platinized metallic plate, so that a strip of lead, thallium or platinum is passed over it, when the passage of an electric current induces slipperiness, and lessens friction.

C. H. COCHRANE.

ELECTROPHORUS. See ELECTRICITY, Vol. VIII, p. 101; also ELECTRICITY, § 12a, in these Supplements.

ELECTROPLATING. See ELECTRO-METALLURGY, Vol. VIII, p. 116.

ELECTROSCOPE. See ELECTRICITY, Vol. VIII, p. 34.

ELECTROTYPE. See TYPOGRAPHY, Vol. XXIII, p. 703.

ELEGY. See POETRY, Vol. XIX, p. 273.

ELEMENTS, NEW. See CHEMISTRY, in these Supplements.

ELEPHANT-BEETLE. A name applied to many species of beetles of the genus *Megasoma*, par-

ticularly *M. elephas*. The name refers to their immense size. They are common in Central and South America, and one species occurs in California.

ELEPHANT-FISH (*Callorhynchus antarcticus*), a cartilaginous fish belonging to the subclass of chimæras (*Holocephali*). The genus contains only one species, which is found in Antarctic seas. The name refers to the prolonged snout, which resembles a proboscis. The fish is of little popular interest, but it possesses many characters which engage the attention of zoölogists. Sometimes the elephant fish is used as food.

ELEPHANTINE, an island of upper Egypt, in the Nile, opposite Assouan, near lat. 24° 5′ N., long. 32° 55′ E. It is very fertile, and has many houses and gardens interspersed among its old ruins. It is about a mile in length. Among the fallen temples of the Pharaohs on this island is the Nilometer, mentioned by Strabo, and used for measuring the height of the river. Elephantine was long an independent kingdom, and the seat of the fifth dynasty of Egypt. Its present inhabitants are nearly all Nubians. There are several syenite-quarries on the island.

ELEPHANT-SEAL OR SEA-ELEPHANT, the popular name of two species of seals (*Phocidæ*), belonging to the genus *Macrorhinus*. They are the largest of the seals. The northern species (*M. angustirostris*) is found on the coast of California and the Pacific coast of Mexico. Specimens have been found which measured twenty feet in length. The species *M. leoninus* is found in southern seas. This is the larger species, specimens measuring 14 to 30 feet in length and 8 to 16 feet in circumference. Both species were formerly hunted for their oil, but now they are rare. The name *elephant* refers to the proboscis of the adult male. See MAMMALIA, Vol. XV, p. 444.

ELEPHANT'S-FOOT, a name primarily applied to the large tuberous stem of *Testudinaria elephantipes*, a South African climber of the family *Dioscoreaceæ*. The stem is roughly shaped, like an elephant's foot, and is covered with thick scales of cork, regularly arranged and separated by grooves. The name is also given to species of the genus *Elephantopus*, one of the *Compositæ*.

ELEPHANT-SHREW (*Macroscelides typicus*), an insectivorous mammal found on the African plains. The animal has long hind legs and progresses by jumping. It is not over nine inches long, including the tail. The name refers, not to the size, but to the elongated nose. The animal lives in burrows, and is diurnal in its habits. The elephant-shrew is a typical member of the African family of jumping-shrews.

ELETS. See OREL, Vol. XVII, p. 826.

ELEUSINE, a genus of Oriental grasses with digitate spikes and large, loose grains. *E. coracana* is cultivated for food in Asia and Africa. *E. Indica* has become naturalized in the United States as a lawn and pasture grass, and is variously known as "crab-grass," "yard-grass," "dog's-tail" and "wire-grass."

ELEUSINIA AND ITS MYSTERIES. See ELEUSINIA, Vol. VIII, p. 126; and MYSTERIES, Vol. XVII, pp. 124–126.

ELEUTHERIA. See PLATÆA, Vol. XIX, p. 177.

ELEVATED ROADS. See RAILWAY, Vol. XX, p. 240; and RAILROADS, in these Supplements.

ELEVATORS OR LIFTS. (For general description, see LIFTS, Vol. XIV, pp. 573–576.) The great demand for elevators, caused by the increased height of buildings, has brought these useful machines to a high degree of perfection. The public has become accustomed to the use of elevators, and has the utmost confidence in their safety and efficiency.

The one thing, more than any other, which has made passenger-elevators perfectly safe in operation is the multiplication of cables. No first-class passenger-elevators are now made that do not have at least four, while they have often six, cables. Four are used for the actual lifting of the cage, and the other two for counterbalance weights. In addition to this, all good machines have safety-appliances, which will prevent the falling of the cage in case the cables give out, or in case, for any cause, the car runs down at an excessive speed. By reason of these manifold precautions it is found as safe, and perhaps safer, to ride on an elevator in a twenty-story building than to ride on the ordinary street-car.

Hydraulic Elevators. Hydraulic elevators are mostly used for passenger service in the best office-buildings, and these are operated by water-pressure from tanks, either in the upper portion of the building or in the basement, but usually in the attic. Powerful pumps, equal in many cases to the water-works of small cities, are placed in the basement of all these large buildings, and the water is pumped from the receiving-tanks in the basement to the supply-tanks above, often under air-pressure in addition to the static pressure due to the head of water. With a proper proportion in the pumps, any desired pressure can be used, and any load may easily be raised. Tall buildings have greatly stimulated the desire for increased speed, so that the hydraulic passenger-elevators in the large buildings are now operated at a speed of from three hundred to four hundred feet per minute, under perfect control, with great smoothness of motion and entire reliability.

Electric Elevators. Electric elevators of various construction have come into general use, and for many purposes are preferred to hydraulic. They are usually made in the form of the worm-gear steam-elevator, winding the rope on a large drum, by means of electric motors instead of steam-engines, and this form has proved, in hundreds of cases, entirely satisfactory. It has also been demonstrated that the cost of operating an electric elevator of this kind is very much less than any other form of elevator; and where current is obtained from street-mains, as is now customary in most of the cities of the country, the simplicity of connections and operation recommends it to a large number of purchasers.

Another form of electric elevator has been introduced, consisting of a long screw operated by an

electric motor which is used to push apart a series of sheaves over which the lifting-ropes of the cage are passed. This machine is still in its experimental stages, and while it operates smoothly and rapidly, its permanence and reliability are not yet established.

All forms of elevators, hydraulic, steam and electric, are used for both passenger and freight purposes. In many tall buildings the number of elevators to accommodate the large structures are from 6 to 16 or 18 in a single building, thus making the top stories as available as the lower. In the higher buildings the elevators are divided into local and express service, so that each story is equally well supplied with quick access.

The increased height in buildings made the demand for counterbalancing the cables, already referred to, much more imperative, and they are now usually counterbalanced by the use of chains under the cars themselves, or attached to the counterbalance weights sufficient to compensate for the transfer of the lifting-cables from one side of the overhead sheaves to the other. In very high buildings the cost of operating hydraulic elevators may thus be reduced one half. See also GRAIN ELEVATORS, in these Supplements. W. E. HALE.

[A working, inclined elevator was shown in 1896. It was a stepped, endless-chain affair, turning at either end about sprocket-wheels.—ED.]

ELGIN, a city of northwestern Illinois, located in Kane County, on the Fox River, 36 miles N.W. of Chicago, on the Chicago, Milwaukee and St. Paul and the Chicago and Northwestern railroads. It is the center of a large dairy business, exporting annually two million five hundred thousand dollars' worth of dairy products, and has important manufactures, especially of watches and watch-cases, carriages, washing-machines, shoes, farming-implements and condensed milk, also meat-packing establishments, cotton and soap factories, etc. The Elgin National Watch Works employ three thousand skilled hands, and manufacture eighteen hundred watches daily. In addition to twelve public schools, there is an academy, a Catholic seminary, a school of manual training, and a public library; also the Northern Illinois Hospital for the Insane, costing $750,000. Pop. 1890, 17,823; 1897, about 25,000.

ELGIN MARBLES. See ELGIN, THOMAS, Vol. VIII, p. 131; ARCHÆOLOGY, Vol. II, p. 345.

ELGINSHIRE OR MORAYSHIRE. See ELGIN, Vol. VIII, p. 129.

ELGON, an extinct volcano in British East Africa, N. E. of Victoria Nyanza; 14,090 feet high.

EL-HAZA, the low-lying coast strip of Arabia, on the Persian Gulf, north of Oman, belonging to Turkey; is generally hot, dry, and sterile, but has numerous oases, where wheat, millet, fruits, and garden vegetables grow plentifully. Camels, horses, and dates are raised and sold in great quantities. A small tribute is payable to the sultan. Area, about 31,000 sq. miles; estimated pop. 150,000.

ÉLIE DE BEAUMONT, JEAN BAPTISTE ARMAND LOUIS LÉONCE, a French engineer and geologist; born at Canon, Calvados, Sept. 25, 1798. He became engineer of mines in 1824; professor in the School of Mines in 1829; professor in the College of France in 1832; member of the Academy of Sciences in 1835 (and, after the death of M. Arago, its permanent secretary); Senator in 1852; and grand officer of the Legion of Honor in 1860. He was also a corresponding member of the academies of Berlin, London, etc. In collaboration with M. Dufrenoy he spent 23 years in preparing the large *Geologic Map of France*, published in sections between 1825 and 1841. He died in Canon, Sept. 22, 1874.

ELIOT, CHARLES WILLIAM, an American educator; born in Boston, Massachusetts, March 20, 1834; graduated at Harvard in 1853; in 1854 he was appointed tutor in mathematics at Harvard; in 1858 became assistant professor in mathematics and chemistry; in 1861 taught chemistry in Lawrence Scientific School; from 1863 to 1865 studied chemistry in Europe; in 1865 became professor of analytical chemistry in the Massachusetts Institute of Technology; and in 1869 was elected president of Harvard University. He wrote a standard *Manual of Qualitative Chemical Analysis* (1869), and his annual reports have done much to advance the cause of higher education. Williams and Princeton made him LL.D. in 1869, and Yale in 1870. He became a fellow of the American Academy of Sciences and of many home and foreign scientific associations.

CHARLES W. ELIOT.

ELIOT, GEORGE. See CROSS, MARY ANN, in these Supplements.

ELIOT, JOHN, an American clergyman; born in Boston, Massachusetts, May 31, 1754. He began to preach in 1776; was for a time chaplain of a Boston regiment, and from 1779 till his death was pastor of the New North Church of Boston. He was one of the founders of the Massachusetts Historical Society, and contributed largely to its collections. He published a *Biographical Dictionary of Eminent Characters in New England.* He died in Boston, Feb. 14, 1813.

ELIOT, SAMUEL, an American historian; born in Boston, Massachusetts, Dec. 22, 1821. He was educated at Harvard, and from 1839 to 1841 was in a Boston counting-house; spent four years in foreign travel; on his return taught private school; was professor of political science and history in Trinity College, Hartford, Connecticut (1856–64); its president (1860–64); lecturer on constitutional law and political science (1864–74); lectured at Harvard (1870–73); was master of the Boston Girls' High School (1872–76); superintendent of the Boston public schools (1878–80); was an overseer of Harvard (1866–72); and in 1868–72 was president of the American Social Science Association. He wrote *The Liberty of Rome* (2 vols., 1849); *The Early Christians* (2 vols., 1853); *Manual of United States History* (1856; revised ed. 1873), etc. Died at Beverly Farms, Mass., Sept. 15, 1898.

ELISABETH AMALIA EUGÉNIE, Empress of Austria, daughter of Maximilian-Joseph, Duke of Bavaria, was born Dec. 24, 1837. On her mother's side she was cousin to the king of Bavaria. She was married to Francis Joseph I, Emperor of Austria, April 24, 1854. In 1857 she accompanied him on a visit to his Italian and Hungarian dominions, when an amnesty was granted to political offenders. The Empress was fond of horseback riding and other outdoor exercises, and often visited England and Ireland for hunting. She bore three children, one son, the late Archduke Rudolf, who committed suicide on Jan. 28, 1889; and two daughters, the Archduchess Gisela Louisa Maria and Maria Valeria Matilda Amelia, the former of whom is married to Prince Leopold of Bavaria, and the latter to Franz Salvator, Archduke of Austria-Tuscany. The Empress Elisabeth was murdered, by being stabbed to the heart, by Luigi Luccheni, an Italian anarchist, at Geneva, Switzerland, Sept. 10, 1898.

ELIZABETH, Cape, the most northern point of Sakhalin Island, in the sea of Okhotsk, eastern Siberia, lat. 54° 24′ N., long. 142° 47′ E. It is also the name of a cape, the western point of Chugatz Island, to the east of the entrance to Cook Inlet, Alaska, lat. 59° 8′ N., long. 151° 50′ W.

ELIZABETH, a city, capital of Union Co., N. J. (see Elizabeth, Vol. VIII, p. 145). Although largely a place of residence for New York business men, Elizabeth has numerous factories, some of national importance. A sewing-machine company has a factory which occupies 22 acres and employs 3,000 men. The city is supplied with excellent water from the Elizabeth river, at its source in the mountains twenty miles distant. The high school building, presented to the city by one of its citizens, Joseph Battin, is one of the finest school buildings in the state. The city has a general hospital and dispensary, a home for aged women, and an orphan asylum. Library Hall, recently completed at a cost of $50,000, contains a large library. The public school system is divided into five branches of instruction—normal training for teachers, manual training, high school, grammar schools, and primary schools. There are also numerous private boarding and day schools, including a business college with a preparatory college course. Population 1880, 28,229; 1890, 37,764; 1895, 43,834.

ELIZABETH, capital of Pasquotank Co., N. C., on the Pasquotank river; has a deep, safe harbor, which can be entered by large vessels; steamboat connection with Norfolk, via the Dismal Swamp canal; a park, state normal school, planing-mill, shingle factories, carriage factories, cotton-seed oil and cotton factories. Pop. 1890, 3,251.

ELIZABETH, a borough of Allegheny Co., Pa., 13 miles S. E. of Pittsburg, is an important coal-shipping depot, and of some importance as an agricultural and boat-building place. Pop. 1890, 1,804.

ELIZABETH, Queen of Roumania (Pauline Elizabeth Ottilie Louise), daughter of the late Prince Hermann of Wied by his marriage with the Princess Maria of Nassau, was born Dec. 29, 1843, in the ancestral castle of Monrepos, in Neuwied, on the Rhine. Five years of European travel followed her twentieth year. Then her romantic spirit went out in admiration of the military career of Karl, prince of Hohenzollern-Sigmaringen, a Prussian lieutenant who had won the affection of the Roumanian nation, and was fighting for a throne, as well as for the heart of Elizabeth von Neuwied. Married on Nov. 15, 1869, her career in Bucharest was a continuous ovation from the chivalric race her husband ruled. In their wars she was the *muma rantilor* ("mother of the wounded") who hovered in the rear of the army; in their victories, the Miriam who composed their triumphal songs. The princely pair were crowned king and queen of Roumania, May 22, 1881. Elizabeth's ceaseless plans for the welfare of her people, and for the promotion of asylums, schools, and charities of all kinds, have made her regarded as Roumania's patron saint.

In 1874 her only child, a daughter, died, and from this sorrow arose her literary activity. In the world of letters she is best known as "Carmen Sylva," a pen-name first adopted in 1880, when she published two poems privately in Leipsic. With a taste for missal-illustration, she adorned the service-books of the Roumanian Church. She rendered the wild and romantic folk-lore of her adopted home into German, exhibiting a dainty and felicitous touch as a translator. Her works include *Sappho* (1880); *Hammerstein* (1880); *Stürme* ("*Storms*," 1881); *Leidens Erdengang* (1882; in English, "*Pilgrim Sorrow*," 1884); *Jehovah* (1882); *Pensées d'une Reine* (1882); *Pelesch-Märchen* (1883); *Le Pic aux Regrets* (1884); *Es Klopft* ("*Some One Knocks*," 1887); *Edlem Vaughan* (a novel, 1891); and *Meister Manole*, a tragedy produced with brilliant success in Vienna, in 1892. Her lyric poems were published under the title *Meine Ruh'* (4 vols., 2d ed., 1886). With Madame Kremnitz she has written the novels *Aus Zwei Weiten* (1882); *Astra* (1886), etc. See Kremnitz, *Carmen Sylva* (1882); Von Stackelberg, *Aus Carmen Sylva's Leben* (4th ed., 1886); Baroness Deichmann, *Life of Carmen Sylva* (1890); and Blanche Roosevelt, *Elisabeth of Roumania* (1891).

ELIZABETHAN ARCHITECTURE. See Architecture, Vol. II, 442; England, Vol. VIII, 343.

ELIZABETH ISLANDS, a chain of 16 small islands belonging to Dukes County, Mass., between Buzzard's Bay and Vineyard Sound. Naushon is the largest; area 8 square miles. Penikese Island was given in 1873, with an endowment of $50,000, by John Anderson to Professor Louis Agassiz for a summer school of natural history, now discontinued.

ELIZABETH STUART, Queen of Bohemia, a daughter of James I, king of England, was born in Falkland Castle, Scotland, Aug. 19, 1596. In 1613 she was married to Frederick V, elector palatine, who six years later was chosen king of Bohemia by the Protestant party. Her contemporaries agree upon her beauty, and history has considered her a heroine. Frederick was defeated in battle in 1620, and, with his wife and 13 children (one of whom became famous as Prince Rupert of the Rhine), passed the remainder of his life in exile and adversity. After his death in 1632, Elizabeth lived for some years with the Earl of Craven, being, it

is said, secretly married to him. She was the grandmother of George I, king of England. Her career has been ably dealt with by Mrs. Everett Green, in *The Lives of the Princesses of England* (1851). She died in England, Feb. 13, 1662. See also DESCARTES, Vol. VII, p. 118.

ELIZABETHTOWN, the capital of Hardin Co., Ill., on the Ohio river, in a lead-bearing region. Its interests are mining and shipping. Pop. 1890, 652.

ELIZABETHTOWN, capital Hardin Co., Ky., 42 miles S. W. of Louisville; has several mills; ships grain, tobacco, and live-stock. Pop. 1890, 2,260.

ELIZABETHTOWN, the capital of Essex Co., N. Y., on Bouquet river, 125 miles N. of Albany, situated in the vicinity of iron-mines, in the Adirondack Mountains. Population 1890, 573.

ELIZABETHTOWN, a borough of Lancaster Co., Pa., 17 miles S. E. of Harrisburg. It manufactures farming implements. Pop. 1890, 1,218.

EL-KHARGEH OR EL-KHÁRIGEH, the ancient Hibe, capital of the Great Oasis, Upper Egypt, situated in lat. 25° 28′ N., long. 30° 40′ E. In the vicinity of the town are numerous ruins. El-Khargeh is also the name of the oasis, watered by warm and cold springs and a stream, and full of acacia and doum-palm trees, besides producing rice. Population of the town, 6,000. See EGYPT, Vol. VII, p. 784.

ELKHART, a city of central northern Indiana, situated at the confluence of the St. Joseph and Elkhart rivers, on the Elkhart and Western, the Cleveland, Cincinnati, Chicago and St. Louis and the Lake Shore and Michigan Southern railroads, in Elkhart County, 60 miles N.W. of Fort Wayne. The town was settled in 1832, and incorporated as a city in 1875. The streets are well paved, and lighted with gas and electricity. The principal manufactures are musical instruments, flour, starch, paper and carriages; it has iron foundries and planing-mills. The locomotive-shops of the Lake Shore railroad are located here. Population 1880, 6,953; 1890, 11,360.

ELKHORN, a railroad junction and the capital of Walworth County, southeastern Wisconsin, on the Chicago, Milwaukee and St. Paul railroad, 52 miles S.E. of Madison. It is situated in a rich farming district. It is also active in manufactures, producing butter, cheese, wagons, saws, brick and tile, treadpowers and wind-mills. Population 1890, 1,447.

ELKHORN RIVER rises in Rock County, in northeastern Nebraska, flows east-southeast past several towns of importance, through a fertile undulating plain, and enters the Platte River, 20 miles W. of Omaha. It is about 250 miles long.

ELKIN, WILLIAM LEWIS, an American astronomer; born in New Orleans, Louisiana, April 29, 1855. He was educated at the University of Strasburg, receiving his doctorate of philosophy in 1881. Shortly afterward he went to the Cape of Good Hope, where for some time he was the coadjutor of Dr. David Gill at the Royal Observatory. Returning to the United States, he became astronomer at Yale College Observatory, where his precise work with the heliometer obtained for him much praise. The satellites of Jupiter and Saturn and the Pleiades were objects of his especial study.

ELKINS, STEPHEN BENTON, an American statesman; born in Perry County, Ohio, Sept. 26, 1841; educated in the public schools of Missouri and at the State University, in Columbia; admitted to the bar in 1863; removed to New Mexico and practiced law. He was a member of the territorial legislative assembly in 1864 and 1865, and was subsequently and successively territorial district attorney, attorney-general and United States district attorney. He was elected to Congress as a Republican in 1873, and re-elected in 1875; was a member of the Republican National Committee, and rendered efficient service during three Presidential campaigns. He removed to West Virginia, and for a time devoted himself to business affairs; was appointed Secretary of War, Dec. 17, 1891, and served until the close of President Harrison's administration. In February, 1894, he was elected a United States Senator to succeed Johnson N. Camden.

ELK, IRISH. See ARCHÆOLOGY, Vol. II, p. 336.

ELK POINT, a township and the capital of Union County, southeastern South Dakota, on the Missouri River, 21 miles N.W. of Sioux City, and on the Chicago, Milwaukee and St. Paul railroad. It is in a grain and stock raising district, and mills a great deal of flour. Population 1895, 2,212.

ELK RAPIDS, a town and the capital of Antrim County, in the northwestern part of the southern peninsula of Michigan. It is on a peninsula between Clam Lake and the east arm of Grand Traverse Bay, and on the Chicago and West Michigan railroad. It has a large saw-mill, chemical-works and a blast-furnace. Population 1894, 1,514.

ELK RIVER, a village and the capital of Sherburne County, Minnesota, situated 38 miles N.W. of St. Paul, on the Elk and Mississippi rivers, and on the Great Northern and Northern Pacific railroads. It has several manufactories; its principal business is lumber, stock and grain. Population 1895, 795.

ELK RIVER rises in Rich Mountains, in Randolph County, eastern central West Virginia, flows westward for 150 miles and enters the Great Kanawha River at Charleston.

ELKTON, a town and the capital of Todd County, southwestern Kentucky, 50 miles N.N.W. of Nashville, Tennessee, on the Louisville and Nashville railroad. It is in an agricultural region, producing mainly tobacco. Population 1890, 1,158.

ELKTON, a town and the capital of Cecil County, northeastern Maryland, at the head of navigation on Elk River, 52 miles N.E. of Baltimore, on the Philadelphia, Wilmington and Baltimore railroad. Flour, iron and papier-maché are manufactured. The town has abundant water-power and a large fertilizer factory. The place was settled by Swedes in 1694. Population 1890, 2,318.

ELLAGIC ACID. See GALLIC ACID, Vol. X, p. 41.

ELLAND, a town of northern England, in the West Riding of Yorkshire, on the river Calder, three miles S.E. of Halifax by rail. It has cloth-mills, and there are valuable stone-quarries in the vicinity. Population, 8,278.

ELLENBOROUGH, JANE ELIZABETH, LADY, a

daughter of Admiral Sir John Digby and a noted heroine of the modern *Chronique Scandaleuse*, was born in 1807, and in 1824 married Edward Law, Earl of Ellenborough. She was divorced for cause in 1830, and within two years married Baron Venningen. She afterward married a Greek general, who deserted her. In 1855 she left Athens for the East, and on the road to Palmyra met the Arab chief Midjouel and married him. This peculiar union seemed the most stable for this woman of many marriages. Midjouel spent half the year with his "Ianthe," as she styled herself, and the remainder with his harem in the desert, where she visited him once a month. She lived this curious desert life to the end of her checkered career, and died in September, 1881. Kinglake dealt with her curious life in his *Eöthen*, and thus preserved her memory from oblivion.

ELLENRIEDER, MARIE, a German painter of excellence; born at Constance, Germany, in 1791; studied in Munich, and in 1820 went to Rome to perfect her knowledge of art. On her return to Germany, she painted a *Martyrdom of St. Stephen* as an altar-piece for the Roman Catholic Church at Karlsruhe. She afterward was appointed court painter at Munich, but subsequently fixed her residence at Constance, and devoted herself exclusively to her profession. Among her principal pieces are the *Transfiguration of St. Bartholemy; Christ Blessing Little Children; Mary and the Infant Jesus; Josesph and the Infant Jesus; St. Cecilia; Faith, Hope and Charity;* and a *Madonna*. She died in June, 1863.

ELLET, CHARLES, an American civil engineer; born in Bucks County, Pennsylvania, Jan. 1, 1810. As a rodman in the survey of the Ohio and Chesapeake canal, he studied mathematics and mechanics, completing his technical education in Paris. On his return to America, he was connected for a time with various railroads, and became the chief engineer of the James River and Kanawha canal. His first original contribution of importance was the substitution of wire cables for chains in the construction of suspension bridges. In 1842 he built the first wire suspension bridge in America, placing it across the Schuylkill River at Philadelphia. Six years later he threw a span of 960 feet clear across the Ohio at Wheeling, and was the first to plan the suspension bridge across the gorge of the Niagara River. He afterward engaged in numerous important engineering works, and in 1861 was commissioned colonel of engineers in the army. In the Crimean War he had submitted proposals to the Russian government to raise the blockade of Sebastopol by means of a fleet of steam-rams; and when the *Monitor-Merrimac* combat in Hampton Roads had demonstrated the accuracy of his conclusions, he was sent to Cairo, to build a fleet of steam-rams to protect the Mississippi gunboat flotilla. He converted nine river steamers into rams in less than three months, and on the 6th of June was at Memphis in command of four of them. Here his vessels inflicted a crushing defeat on the Confederate flotilla, destroying all but one of their eight steam-rams. Next day Memphis capitulated, but Colonel Ellet was wounded in the knee by a musket-ball. His health being impaired by his arduous labors, he was removed to Cairo, and died there, June 21, 1862. His professional writings were more valuable than numerous. *Coast and Harbor Defenses* (1855) was a prophetic forecast of a pressing need of recent years.

ELLICE ISLANDS. See POLYNESIA, Vol. XIX, pp. 420, 422, 427.

ELLENSBURG, a city and the capital of Kittitas County, central Washington, on the Yakima River, and on the Northern Pacific railroad. It has the state normal school, and is in a mining, stock-raising and agricultural district. Population 1890, 2,768.

ELLENVILLE, a village of Ulster County, southeastern New York, 30 miles W. of the Hudson River, situated at the foot of Shawangunk Mountains, on the Delaware and Hudson canal and on the New York, Ontario and Western railroad. It has fine public and private buildings, is a favorite summer resort, and is the seat of Ulster Seminary. Glass, cutlery, leather, stoneware, pottery and boats are manufactured. Near the village are valuable quarries of bluestone; it is also the center of the huckleberry region. Population 1890, 2,881.

ELLERY, WILLIAM, a signer of the Declaration of Independence, was born in Newport, Rhode Island, Dec. 22, 1727. He began the practice of law in 1770; became a member of the Continental Congress in 1776, continuing in office till 1786, with the exception of the years 1780 and 1782; was commissioner of the Continental Loan Office for Rhode Island in 1786; for a time was chief justice of the Rhode Island superior court, and collector of Newport from 1790 till his death, which occurred Feb. 15, 1820.—FRANK ELLERY, his son (1794–1871), entered the navy and rose to the rank of commodore.

ELLICOTT, ANDREW, an American civil engineer; born in Bucks County, Pennsylvania, Jan. 24, 1754. He early exhibited remarkable mathematical proficiency, secured scientific notice, and was employed in the demarcation of state boundary lines. He mapped the topographical features of the Niagara River, took part in the laying out of Washington City, fortified Presque Isle, and laid out the towns of Erie and Franklin, Pennsylvania. His chief work was the running of the boundary line between Spanish Florida and the United States, a work of four years, the expenses of which he detailed in a quarto volume. In 1812 he became professor of mathematics at West Point Military Academy, where he died, Aug. 28, 1820.

ELLICOTT, CHARLES JOHN, an English divine, bishop of Gloucester and Bristol; born at Whitwell, near Stamford, April 25, 1819. He graduated from Cambridge University in 1841, and was elected fellow of St. John's College. In 1848 he became rector of Pilton, Rutlandshire, and professor of divinity at King's College, London, in 1858; Hulsean lecturer at Cambridge in 1859, and Hulsean professor of divinity the year after. He was nominated dean of Exeter in 1861, and raised to the episcopal bench in 1863. Dr. Ellicott was chairman for 11 years of the New Testament Revision Committee, and well

known as a commentator on the epistles of the New Testament.

ELLICOTT CITY, the county seat of Howard County, central Maryland, on the Patapsco River, 10 miles S.W. of Baltimore, deriving its name from its founders, the Quaker father and uncle of Andrew Ellicott (q.v., in these Supplements). It has two cotton factories, a large flouring-mill, a barrel factory, machine-shop, a foundry and valuable granite-quarries. It is the seat of Rock Hill and of St. Charles colleges. Population, 1,488.

ELLICOTTVILLE, a village of Cattaraugus County, western New York, on Great Valley Creek, 44 miles S.S.E. of Buffalo, on the Buffalo, Rochester and Pittsburg railroad. It is in an agricultural region. Population, 852.

ELLINWOOD, Frank Fields, an American clergyman; born in Kirkland, Oneida County, New York, June 20, 1826; educated at Hamilton College, at Auburn, and at Princeton. He was pastor in Belvidere, New Jersey, from 1853 to 1854, and pastor in Rochester, New York, for 11 years. In 1865 he was chosen secretary of the Church Erection Committee of the Presbyterian Church, was secretary of the Memorial Committee for a year from 1870, and afterward elected secretary for foreign missions. His works include *The Great Conquest* (1876) and *Oriental Religions and Christianity* (1892).

ELLIOT, Jean (1727–1805). See Cockburn, Mrs. Alison, Vol. VI, p. 98.

ELLIOTT, Charles, an American Methodist Episcopal clergyman and author; born in Glenconway, County Donegal, Ireland, May 16, 1792. He entered the ministry, emigrated to the United States in 1814 and settled in Ohio in 1818. Here he edited the *Western Christian Advocate* and other publications. He was successively professor of languages at Madison College, Uniontown, Pennsylvania, and president of Iowa Wesleyan University. His many religious works include *The Sinfulness of American Slavery* (1851); *A History of the Great Methodist Secession* (1855); and several other works. He died in Mount Pleasant, Iowa, Jan. 3, 1869.

ELLIOTT, Charles Loring, an American portrait-painter; born in Scipio, New York, in December, 1812. He was a pupil of Trumbull, and painted many portraits of American celebrities. He became an associate of the National Academy in 1845, and academician the following year. He was considered the best portrait-painter of his time, excelling in color. One of his principal works is a portrait of Matthew Vassar, now in Vassar College. He died in Albany, New York, Aug. 25, 1868.

ELLIOTT, Robert Woodward Barnwell, an American Protestant Episcopal bishop; born in Beaufort, South Carolina, Aug. 16, 1840. He entered the Confederate army at the beginning of the Civil War, and attained the rank of major. In 1868 he took deacon's orders; was ordained priest in 1871, and the same year became pastor of St. Philip's Church, in Savannah, Georgia. In 1874 he was consecrated missionary bishop of western Texas. He died Aug. 26, 1887.

ELLIOTT, Stephen, an American naturalist; born at Beaufort, South Carolina, Nov. 11, 1771; educated at Yale; in 1793 he became a member of the legislature of South Carolina, and continued in office until 1812, when he became president of the bank of the state. He was one of the founders of the Literary and Philosophical Society of South Carolina; in 1825 was instrumental in the establishment of the State Medical College, and was its professor of natural history and botany. He published a work on *The Botany of South Carolina and Georgia*. He died at Charleston, South Carolina, March 28, 1830.

ELLIOTT, Stephen, Jr., an American Protestant Episcopal bishop, son of the naturalist; born at Beaufort, South Carolina, Aug. 31, 1806; graduated at Harvard College in 1824. He practiced law from 1827 to 1833; was ordained deacon in 1835; was professor of sacred literature in South Carolina College; took priest's orders in 1836; became first bishop of the diocese of Georgia in 1840; in 1841 was made rector of St. John's Church, Savannah, and in 1844 became provisional bishop of Florida. Subsequently he was rector of Christ's Church, Savannah, until his lamented death there, Dec. 21, 1866.

ELLIOTT, William, an American lawyer; born in Beaufort, South Carolina, Sept. 3, 1838; educated at Beaufort College, Harvard University and the University of Virginia; entered the profession of law in Charleston, South Carolina, in 1861, and served as an officer in the Confederate army during the war of the Rebellion; elected a member of the state legislature and intendant of Beaufort in 1866; was a delegate to the Democratic national convention in 1876 and 1888, and a Democratic Presidential elector for the state at large in 1880. He was elected a Representative from the seventh Congressional district of South Carolina to the Fiftieth Congress; was declared elected to the Fifty-first Congress, but was unseated by the House of Representatives. He was elected from the same district to the Fifty-second Congress in 1890.

ELLIPSE. See Conic Sections, Vol. VI, p. 273.

ELLIS, Alexander John (formerly Sharpe, the name having been changed by royal license in 1825), an English philologist; born at Hoxton, near London, June 14, 1814; studied at Shrewsbury and Eton; graduated with high honors at Trinity College, Cambridge, in 1837; and studied law in the Middle Temple. He published *The Alphabet of Nature* (1845); *Essentials of Phonetics* (1848); *Early English Pronunciation* (1869); *Speech in Song* (1878), *Basis of Music;* and translated Ohm's *Spirit of Mathematical Analysis* and Helmholtz's *Sensations of Tone*. He died Oct. 28, 1890.

ELLIS, George Edward, an American Unitarian clergyman and author; born in Boston, Massachusetts, Aug. 8, 1814. He graduated at Harvard, and became, in 1840, pastor of the Harvard Unitarian Church, Charlestown, Massachusetts, remaining there until 1869; was professor of systematic theology in Harvard Divinity School in 1857–63; was at one time editor of the *Christian Register*, and later of the *Christian Examiner*. In 1887 he became president of the Massachusetts Historical Society. He was the author of many works, principally of a biographical

or historical nature; among them, *A Half Century of the Unitarian Controversy* (1857) and *The Puritan Age and Rule in the Colony of the Massachusetts Bay, 1629–85* (1888). Died in Boston, Dec. 21, 1894.

ELLIS, Robinson, an English classical scholar; born at Barming, Kent, Sept. 5, 1834; educated at Walthamstow, at Rugby, and at Oxford. He was elected a fellow of Trinity College, Oxford, and there remained till 1870, when he became professor of Latin in University College, London. Six years later he returned to Oxford. He contributed philological articles to English and American periodicals, and published critical editions of the *Ibis* of Ovid and of the text of Catullus.

ELLSKWATAWA, an American Indian prophet; born near Chillicothe, Ohio, in 1775; the son of a Shawnee chief, and brother of Tecumseh. In 1809 the government purchased of the Indians a large tract of country on both sides of the Wabash River, which included the section then held by him and his followers. Two years after this transaction Ellskwatawa appeared at the battle of Tippecanoe, where he directed the Indian attack. After peace was declared between the United States and Great Britain, the prophet received an English pension, and dwelt in Canada until 1826. Later, with Tecumseh's surviving son he settled beyond the Mississippi. The date of his death is unknown.

ELLSWORTH, a town and the capital of Ellsworth County, central Kansas, on the Smoky Hill River, and on the Union Pacific railroad. It has good water-works, parks, schools, churches and mills. The immense bed of rock-salt of central Kansas was first discovered here at a depth of 730 feet. It is in the center of an extensive wheat section, and it has a large grain elevator. Valuable clays, gypsum and mineral paint are found in the vicinity. Population 1895, 1,415.

ELLSWORTH, a city of southeastern Maine, capital of Hancock County, on the Maine Central railroad. The Union River is spanned here by several bridges. Its important industries are lumber, shoemaking and ship-building. It has a public library. Population 1880, 5,052; 1890, 4,804. (See Ellsworth, Vol. VIII, p. 151.)

ELLSWORTH, a town and the capital of Pierce County, central western Wisconsin, 40 miles S.E. of St. Paul, Minnesota, on the Chicago, St. Paul, Minneapolis and Omaha railroad. It has a stave-mill, steam saw-mill and a trade in farm produce. Population 1890, 670.

EPHRAIM E. ELLSWORTH.

ELLSWORTH, Ephraim Elmer, an American soldier; born in Mechanicsville, New York, April 23, 1837; studied law and became a solicitor of patents in Chicago. In 1860 he was colonel of a regiment of zouaves renowned for the perfection of its discipline. In 1861 he went to New York, where, in April, he organized a zouave regiment, was appointed its colonel and was sent to Alexandria, Virginia. Here, in taking possession of the place, he tore down a Confederate flag floating above a hotel. On his way from the roof he was shot by the proprietor and instantly killed, May 24, 1861.

ELLSWORTH, Oliver, an American jurist; was born in Windsor, Connecticut, April 29, 1745. Studied for years at Yale College, but graduated from Princeton College at the age of 21. Was admitted to the Connecticut bar in 1771; settled in Hartford, and was sent to the state legislature in 1775. In 1778 he was a delegate to the Continental Congress, where he served on committees for the marine service, for appeals and for the amendment of the Articles of Confederation. From 1780 to 1784 he was a member of the state council, and then was appointed on the bench of the superior court of Connecticut. In 1787 he was a delegate to the convention at Philadelphia which framed the Constitution of the United States, and took a leading part in its proceedings. Though a strong nationalist, he brought forward, with Roger Sherman, and succeeded in carrying, a compromise which gave the smaller states an equal representation in the Senate. When the new constitution was before the convention of his own state he resolutely urged its adoption, and in 1789 was sent to the United States Senate, where he became distinguished as a debater, as the chairman of the committee for organizing the judiciary of the United States, as a stanch supporter of Washington's administration and as the leader of the Federal party in the Senate. Through his efforts, John Jay was sent to England in 1794, and it was mainly through his support that the treaty thereupon negotiated was confirmed by the Senate. In 1796 the President appointed him chief justice of the supreme court, to succeed John Jay. His decisions were noted for their force and brevity, and long were regarded as precedents. In 1799 President Adams sent him, with William R. Davie and William V. Murray, as envoy extraordinary to Paris to settle, with Napoleon's government, the French spoliation claims, which arose from the Jay treaty, and a consequent quasi-war with that country. The treaty of March 2, 1800, terminated the strained relations between France and the United States. Soon after reaching home in 1800, Judge Ellsworth resigned, on account of ill health. In 1802 he became a member of the governor's council, to which appellate judicial functions were attached. In 1807 he declined the office of chief justice of his state, and on the 26th of November in the same year, died in Windsor, his native town, respected for the strength of his religious convictions, his unimpeachable honesty and the vigor of his intellect. He received the degree of doctor of laws from Yale, Dartmouth and the College of New Jersey.

ELLWANGEN, a town of eastern Würtemberg, on the Jagst River, 55 miles N. of Ulm by rail. It has a cathedral, a hospital and a gymnasium; also a bleaching establishment and tanneries. The old castle of Hohen-Ellwangen has been used as an agricultural school since 1843. Population, 4,793.

ELM, a village of Switzerland, at the head of a

valley, in the canton of Glarus, 10 miles S.W. of Glarus, formerly celebrated for its sulphur spring. In 1881 the whole of the northern side of the Tschingelberg (10,230 feet) crashed down upon it, destroying a large part of the village, and filling the valley with *débris*. Population, 1,028.

ELMALU, a town of southwestern Asia Minor, in the province of Konieh, on the Lycian table-land, 45 miles W. of Adalia. It has manufactories of red leather and dye-works. Population, 25,000, chiefly Greeks and Armenians.

ELMHURST, a village of Dupage County, northeastern Illinois, 15 miles W. of Chicago, on Chicago and Northwestern railroad. It has a Lutheran college. The town is principally a residence suburb of Chicago. Population 1890, 1,050.

ELMIRA, a city of New York, and capital of Chemung County. Six railroads center here; viz., the New York, Lake Erie and Western, the Delaware, Lackawanna and Western, the Northern Central, the Lehigh Valley, the Elmira, Cortland and Northern, and the Tioga. The city contains ninety miles of streets, most of which are paved, lined with handsome shade trees, and well lighted with gas and electricity. The area of the city is three thousand acres. A board of trade was organized in 1879. Manufacturing interests are numerous and extensive, giving employment to about six thousand persons, and including iron bridges, fire-extinguishing engines and apparatus, furnaces, silk and woolen fabrics, etc. The educational advantages of Elmira are excellent. The city has over three million dollars invested in school property. There are nine public schools, four private select schools, three commercial colleges, and the Elmira Female College (Presbyterian)—Elmira College since 1890—with an endowment of one hundred thousand dollars. Among the charitable institutions are the Arnot-Ogden Memorial Hospital, Home for the Aged, Orphan's Home, Industrial School, and the Anchorage. The State Reformatory here is remarkable as embodying in its practice the ideas in penology of Z. R. Brockway, the superintendent. Each inmate has to work out his own position, the few incorrigibles being remitted to the state's prisons. The city contains six parks, among them Eldridge Park, with an area of 89 acres, Riverside Park, 40 acres, and Grove Park, 10 acres. During the war of the Rebellion Elmira was a recruiting-camp and a place of confinement for prisoners of war. Population 1880, 20,541; 1890, 30,983. See ELMIRA, Vol. VIII, p. 153.

EL MISTI, a volcano of the Andes, in Arequipa department, Peru, overlooking the city of Arequipa; height 20,320 feet. Harvard college has an observatory here at a height of 8,060 feet, and a meteorological station at 19,200 feet.

ELMORE, a village of Ottawa Co., Ohio, on Portage river, 16 miles from Toledo and 20 miles from Lake Erie, on the St. Clair and Northern railroad; has a bicycle, stave, and barrel factories, brick and tile-works, and a flour-mill. Pop. 1890, 1,198.

ELMSHORN, a town of Schleswig-Holstein, Prussia, 20 miles N. W. of Hamburg, on a railroad and on the Kruckau, a navigable stream and feeder of the Elbe. It is well built, has considerable manufactures, and an active trade in grain; it has a boat-building yard and tanneries. Population, 9,752.

ELMSLEY, PETER, an English classical scholar; born in 1773; educated at Oxford, where he graduated B.A. in 1794, and in 1823 was appointed principal of St. Albans Hall and Camden professor of ancient history. He contributed to the *Edinburgh* and *Quarterly Reviews*, but is remembered now only for his valuable critical work on Sophocles and Euripides. His death took place in 1825.

ELMWOOD, a village of Peoria County, northern central Illinois, 163 miles S.W. of Chicago, on the Chicago, Burlington and Quincy railroad. Principal industries, mining coal and making paper. Population 1890, 1,548.

ELOHIM (Heb., plural of *Eloäh;* Arab., *Ilâh;* Chald., *Elâh;* Syr., *Alôh*), might, power; in plur., intensified, collective, highest power—great beings, kings, angels, gods, Deity. As a *pluralis excellentiæ* or *majestatis*, and joined to the singular verb, it denotes, with very rare exceptions, *the One* true God. Joined to a plural verb, however, it usually means gods in general, whether including the One or not. For the place of this word, as distinguished from Yaveh, or Jehovah, in the higher criticism of the Pentateuch, see PENTATEUCH, Vol. XVIII, pp. 505–507.

EL PASO, a city of Woodford County, northern central Illinois, on the Illinois Central and Toledo, Peoria and Western railroads. It has mills, grain-elevators, agricultural implement works and a carriage manufactory. Population 1890, 1,353.

EL PASO, a city of western Texas, and the capital of El Paso County, situated on the left bank of the Rio Grande River, at one of the great gateways of travel between the United States and Mexico. In 1881 the first railroad reached the city; ten years later the river was bridged and five great trunk lines centered here, having their main connections with the Pacific Coast, the Mexican capital and the great grazing and mining regions of the Rocky Mountains. It is 3,830 feet above sea-level and has a mean annual temperature of 63° F. There are near by lacustrine salt deposits, and the region is supposed to be rich in minerals. It has a constantly increasing trade, and the customs revenue is important. There is no municipal debt. The people are of mixed races, Mexicans, Indian half-breeds and all varieties of Americans. The United States government has established a military post in the vicinity, the citizens having donated one thousand acres of land for that purpose. Population 1880, 730; 1890, 10,338.

ELPHINSTON, JAMES, a British poet and man of letters; born at Edinburgh in 1721, and began life as a teacher near London. He became the close friend of Dr. Johnson, whose *Rambler* he edited in eight volumes. In the face of much public ridicule, Elphinston for years persisted in an attempt to change the orthography of the English language to a phonetic basis. He died in 1809.

EL RENO, a village and the capital of Canadian County, central Oklahoma, near the Canadian River, on the Chicago, Rock Island and Pacific, and Choctaw, Oklahoma and Gulf railroads, 33 miles W.

of Oklahoma. It has flour-mills, manufactories of wagons, carriages, etc., and several schools, churches and public buildings. Population 1890, 5,000.

ELSSLER, Fanny, a noted danseuse; born in Vienna, Austria, June 23, 1810. She became famous as a dancer, and appeared in nearly every European country, and in the United States, entrancing the public by her beauty, grace and amiability, her art eliciting from Emerson the encomium, "the poetry of motion." She retired from the stage with a handsome fortune in 1851, and died, Nov. 28, 1884.—Her sister, Therese, who was born 1808, was almost as well known as a dancer. She was morganatically married to Prince Adalbert of Prussia in 1851, and was created Freifrau von Barnim by the king in the same year. She died in 1878.

ELSTER, the name of two rivers of Germany, the White and the Black Elster. The White Elster rises at the foot of the Elster Mountains, in the kingdom of Saxony, near the northwestern boundary of Bohemia, flows in a northerly direction, and falls into the Saale three miles south of the town of Halle, in Prussia. Its chief affluent is the Pleisse, from the right. Total length, 110 miles. The Black Elster rises in the western part of the kingdom of Saxony, within two miles of Elstra, flows northwest, enters Prussia, and joins the Elbe eight miles southeast of Wittenberg. Length, 105 miles.

ELSTER, Kristian, a Norwegian novelist; born March 4, 1841. He was author of *Tora Trondal* and *Farlige Folk*, both works of merit. The latter had not yet appeared in print at the time of the author's death. Some short sketches of his were collected and published by Alexander Kjilland in a volume entitled *Solskyer* (1882). He died April 11, 1881.

ELSTRACKE, Renold, a noted English engraver; born, probably in Belgium, in the sixteenth century. His engravings, including portraits of the kings of England, of Mary Queen of Scots, and other notables, are much sought after, chiefly from their rarity.

ELSWICK, a parish on the outskirts of Newcastle, Northumberland County, northern England, on the River Tyne, noted for its extensive gunworks. The works of Sir W. G. Armstrong, Mitchell and Company are located here. The engineering section of these works dates from 1847, the ordnance-works from 1857. The frontage on the river is about one mile, the entire area about 125 acres, and 14,000 people are employed. Population 51,600.

ELTON, Charles Isaac, an eminent English jurist and ethnologist; born at Whitestaunton, Somerset, England, in 1839. He was educated at Cheltenham and Balliol College, Oxford; became fellow of Queen's College in 1862; was called to the bar at Lincoln's Inn in 1865, and afterward became a Queen's Counsel. He was returned to Parliament as a Conservative in 1884, was defeated in 1885, but again returned the year after. His books had already gained him reputation as a jurist, when he placed himself in the front rank of English ethnologists by his *Origins of English History* (1882). His other works include *Norway: The Road and the Fell* (1864); *The Tenures of Kent* (1867); *A Treatise on Commons and Waste Lands* (1868); *A Treatise on the Law of Copyholds and Customary Tenures of Land* (1874), and *Custom and Tenant-Right* (1882).

ELWOOD, a town of Madison County, northwestern central Indiana, 38 miles N.N.E. of Indianapolis, on the Lake Erie and Western and the Pittsburg, Cincinnati, Chicago and St. Louis railroads. It has saw and stave mills, glass, tin and flax factories, and exports grain and live-stock. Population 1890, 9,029.

ELY, Richard Theodore, an American political economist; born at Ripley, New York, April 13, 1854; educated at Fredonia and at Dartmouth and Columbia Colleges, and at the University of Heidelberg, Germany; professor of political economy at Johns Hopkins University (1885–92); subsequently director of the school of political science and professor of political economy in the University of Wisconsin, a position he continues to fill. His writings have been freely criticised on the score of socialistic tendencies, the State Superintendent of Public Education of Wisconsin having charged him with the inculcation of pernicious theories, an accusation from which he was officially exonerated by the board of regents of the university. His works include *French and German Socialism in Modern Times* (1883); *The Past and Present of Political Economy* (1884); *Recent American Socialism* (1885); *The Labor Movement in America* (1886); *Organization of the American Economical Association* (1886); *Coöperation in America* (1887); *Problems of To-Day* (1888); *An Introduction to Political Economy* (1889); *Social Aspects of Christianity* (1889); *Outlines of Economics* (1893); *Socialism and Social Reform*, a publication particularly distasteful to his professional opponents (1894); and *Taxation in American States and Cities*, one of his more recent works.

RICHARD T. ELY

ELYRIA, a village and the capital of Lorain County, northern Ohio, finely situated at the junction of the east and west branches of the Black River, seven miles S. of Lake Erie, on the Cleveland, Lorain and Wheeling and Lake Shore and Michigan Southern railroads. It contains a telegraph college, gas factory, has excellent water-power and manufactures cheese, building-stone, grindstones, tobacco, screws and confectionery. Population, 5,611.

ELYSÉE, The Palace of the, one of the famous buildings of Paris, France, situated at the junction of the Avenue de Marigny with the Rue du Faubourg St. Honoré. Erected in 1718 for the Count d'Evreux, it served, successively, as a residence for Madame de Pompadour, her brother the Marquis de Marigny, visiting ambassadors, the financier Beaujon, and the Duchesse de Bourbon. In 1848 it was given the name of *L'Hôtel de la Présidence*. Here the *coup d'état* of December, 1851, was planned. In

the French exposition of 1867 it housed the visiting foreign potentates. It is now the official residence of the President of the French Republic.

ELZE, FRIEDRICH KARL, a German Shakespearean scholar; born at Dessau, May 22, 1821. He studied at Leipsic and Berlin, devoting especial attention to English literature. In 1875 he was appointed to the newly established chair of English language and literature at Halle. He wrote biographies of Walter Scott, Byron and Shakespeare, and published, in English, his *Notes on Elizabethan Dramatists* (3 vols., 1889). He died at Halle, Jan. 21, 1889.

EMANCIPATION. See SLAVERY, Vol. XXII, pp. 129–144.

EMBA, AIMBA OR JEMBA, a river of the Asiatic Russian government of Uralsk, in the Kirghiz territory, rising at the western base of the Muehajar or Mugojar Mountains, flowing southwest, and entering the Caspian Sea after a course of about 350 miles.

EMBARGO, a public proclamation issued by the authorities of a state, prohibiting vessels from departing from certain ports or from all ports of the state. A civil embargo is the detention of the vessels belonging to the state issuing the proclamation. A hostile embargo is the detention of vessels belonging to the enemy. If war results while a hostile embargo is in force, the vessels detained are confiscated. An embargo may be ordered upon all vessels in port at the time, or upon certain vessels only, and frequently prohibits the exportation of goods until the embargo is released. An embargo is ordered only in time of war, or of threatened hostilities.

EMBIOTOCIDÆ. See ICHTHYOLOGY, Vol. XII, p. 691.

EMBLICA, a genus of plants of the family *Euphorbiaceæ;* having a fleshy fruit. *E. officinalis* is a tree found in most parts of India, with a crooked stem, thinly scattered spreading branches, long narrow leaves, minute greenish flowers, and a globular fruit, about the size of a gall-nut, which is a source of tannin.

EMBOLISM. See SURGERY, Vol. XX, p. 684.

EMBOLITE. See MINERALOGY, Vol. XVI, p. 384.

EMBRACERY, the offense usually called jury-bribery, and consists of any act or attempt intended to corrupt or influence a jury, or any juryman, to decide favorably to one side in the controversy. Any act which tends to influence the verdict of a jury, if done for that purpose, is embracery, and may consist of the use of money, promises, persuasion, threats or entertainment. The acceptance or solicitation of a bribe by a juryman is also embracery.

EMBRASURE. See FORTIFICATION, Vol. IX, p. 432.

EMBRYOGENY, in botany, the development of the embryo from the spore (whether sexual or asexual). The first few segmentations have been considered quite important in indicating phylogeny, as they are found common to large groups whose members later become very diverse. The study of embryogeny demands careful manipulation and a special technique. See MORPHOLOGY, in these Supplements.

*EMBRYOLOGY. The rapid advances in the science of embryology in the past ten years have brought about so many radical changes, as regards the facts of development in animals and plants, and their interpretation, that a restatement of the scope and aims of the science in its new aspect is rendered desirable. It is the object of the present article to supplement, on the animal side, the original article on EMBRYOLOGY, Vol. VIII, pp. 163–169, and that on REPRODUCTION, Vol XX, pp. 407–431, in such a way as to show the direction of progress and indicate some of the newer lines of investigation upon which embryologists have been engaged.

It is first to be observed that embryology is passing through a transition stage, in which its problems are being subjected to a new method of treatment. They are being approached from the standpoints of physiology and experiment, and such a wealth of new facts has already been brought to light, that, while it is clear the science is in a great wave of advance, many fundamental conceptions are undergoing modification, and are thrown into an unsettled condition. It is impracticable at the present time, particularly in the limits prescribed for this article, to attempt to give a systematic summary of the advance in knowledge regarding the embryology of the different groups of animals. The best course is to point out the line of progress and mention some of the newer problems of the science.

In reviewing the progress of the past ten years it is not merely great extension of knowledge in this department that is encountered, but the fact that the increase in knowledge has often made fundamental changes in the interpretation of the known facts; much that was regarded as established is, in the light of new investigation, found to be inadequate, and is now undergoing reconstruction.

During this period the importance of the embryological record to morphologists and physiologists has been more fully demonstrated than ever before. Embryology is now recognized as the most suggestive of the biological sciences, since it gives the best basis for understanding organisms in their relation to one another. It is the richest field open to investigators to furnish clews to the meaning of either adult or rudimentary structures. It was long since established by embryological study that every organism, no matter how complex, starts in the condition of a single microscopic cell, and between this simple state and the adult organism every graduation is exhibited. Each time a particular organism is developed, these changes are repeated in the same sequence. It is clear, that if we could follow these processes step by step, and see every modification and every complication as it is added, we should have a key for understanding the fundamental plan of construction of tissues, organs and animals. The adult stage of any animal represents the last step in a series of gradually acquired modifications, and it is evident that the adult anatomical conditions can be understood only in the light of their development. Therefore, we are driven to embryology for

*Copyright, 1897, by The Werner Company.

the full elucidation of any problem in anatomy. If, for instance, the vertebrate brain is examined after its modifications are all made, i.e., in the adult condition, we are dealing with a structure of remarkable complexity, and the fundamental plan of its construction (as a segmented tube) cannot be discovered so long as observations are confined to adult brains. Even though we resort to comparative studies, observing the brains of the simplest animals, and comparing them with those of the more complex, nevertheless the real constructive plan in which all vertebrate brains agree—in being composed of a series of (at first) similar segments—will not be revealed. Fortunately, the structure can be traced in the process of becoming; and its primitive condition in the embryo is accessible to observation. What is true of the brain in this regard is true likewise of the other organs of the body, and embryology is thus shown to be basal in its relation to the science of morphology.

But it is to be remembered there is something more important about a living organism than its structure,—namely, its life,—and the analysis of its vital actions is the chief aim of biological study. It will therefore be well to inquire how embryological study is related to the physiological side of biology. Whitman states the situation with great clearness, as follows: "Morphology raises the question, How came the organic mechanism into existence? Has it had a history, reaching its present state of perfection through a long series of gradations, the first term of which was a relatively simple stage? The embryological history is traced out, and the palæontological records are searched, until the evidence from both sources establishes the fact that the organ or organism under study is but the summation of modifications and elaborations of a relatively simple primordial. This point settled, physiology is called upon to complete the story. Have the functions remained the same throughout the series? or have they undergone a series of modifications, differentiations and improvements more or less parallel with the morphological series?"

There is good reason to believe that qualitative changes take place in the protoplasm as development proceeds. For example, if the right and left halves of a vertebrate egg are mechanically separated in the earliest stages of segmentation, the separated parts are capable of regenerating the part removed, and building up a complete symmetrical embryo that is smaller than the normal embryo. This power is soon lost, as Wilson has shown, in *Amphioxus* embryos. If the cells are separated after eight cells have been formed by segmentation, the protoplasm cannot produce a gastrula. The separated blastomeres undergo partial development, but cannot reach even the gastrula condition. The protoplasm has become so far differentiated that a separated part of the embryo is incapable of regenerating the whole, but in the two or four cell stages, the physiological differentiation has not proceeded so far, and a regeneration of the whole is possible.

Many other experiments of this nature indicate that "there is a steady increase in complexity of the idioplasm (or protoplasm) in the growing embryo." Wilson has pointed out the bearing of this in discussing homologies. The "adult homologies need not necessarily pre-exist in the form of egg-homologies, but may be created as ontogeny progresses." This leads us to qualify what was said above about the comparative study of adult structures. Homologies are not all indicated or settled by embryology. Comparative embryology and comparative anatomy should be pursued simultaneously, each in the light of observations derived from the other.

The scope of embryology, in its modern aspect, may now be indicated. The science embraces the study, comparatively and comprehensively, of all changes, both structural and physiological, through which an organism passes on its way from the egg to the period of hatching, and, also, the larval stages, where they exist, that extend from hatching to the metamorphosis. It deals comprehensively with all the phenomena of development, takes into account the responses of the embryo to its environment and the multitudinous questions that arise along the way. It has been shown that embryology is important in morphology, it is also very important to the comprehension of physiology, and, through these two sciences, is related to medicine.

In embryological study one meets with many unexpected and problematical structures. The great series of animals, in passing through the different embryonic stages, exhibit many structures not present in the adult. Familiar examples of such rudimentary structures are the gill-slits and gill-arches that make their appearance in the embryos of all higher animals, not excepting man. In birds and mammals they are not of use to the embryo, and energy, apparently not well directed, is consumed in forming them. Moreover, while they are present, the circulatory system is like that of a fish; the fish-like heart and aortic arches passing through each branchial arch. These blood-vessels are built up, and almost immediately undergo degeneration, some being entirely obliterated, and others remaining in a modified condition as a part of the circulatory system of later embryonic life. Rudimentary teeth make their appearance in the embryo of the whalebone-whale, but they are not destined to cut the gum, and disappear without having been of use to the animal. The pineal gland, remnant of a once functional eye, continues to appear in the brains of all vertebrates.

These, and a multitude of similar cases, lead to a consideration of how the facts of embryology are interpreted. The observed facts have led to the belief that animals are constrained to repeat in their individual development the general features of development of the race. This hypothesis is called the recapitulation theory. It was suggested in the writings of Von Baer, but was first clearly enunciated by Fritz Müller in 1863, and has been adopted by embryologists to account for the occurrence of these otherwise inexplicable structures. The appearance of gills in the bird, and mammal, is accounted for by supposing that they are derived from ancestors of aquatic habits, in which the gills were of use as breathing-organs, and they have been handed along to birds and mammals through

the operation of heredity. But embryologists have been forced to recognize that the steps in ancestral development are not repeated in a complete and orderly succession in any animal, and the recapitulation theory, which at first would seem to make everything plain, must be extensively qualified. Every structure that appears in the embryo is not necessarily a survival. Some are undoubtedly secondarily acquired for the advantage of the growing embryo, and it thus becomes a matter of importance to distinguish between what is ancestral and what is secondarily acquired. There are also other facts that tend to obscure the embryological record. There is a tendency for animals to develop along a direct line and to omit ancestral phases; there is also a tendency to distortion: so that the sequence of organ-formation does not represent the sequence of their appearance in the race. There is also a tendency for certain stages to be unduly prolonged and others abbreviated. At first the recapitulation theory was applied with great confidence to account for the peculiarities of every embryological structure, but since this is found to be going too far, there has been a reaction against the too extensive application of this theory. "The great fault of embryology has been the tendency to explain any and every operation of development as merely the result of inheritance." It will be shown in the section on experimental embryology that surrounding conditions have much to do with individual development, and the course of events may depend largely upon stimuli coming from without, and not exclusively on an inherited tendency. It is, nevertheless, clear that the recapitulation theory is suggestive and of great value; it is not to be set aside, but to be applied with care and circumspection.

A pertinent question arises at this point: Why do animals continue to recapitulate, in part, their ancestral phases? They certainly would not build up useless organs if they were not in some way constrained to do so. There is clearly an attempt on the part of the organism to shake itself free from the past and develop along a direct line, but it is never completely successful. The protoplasm cannot escape from the influence of its past experiences. Kleinenberg has suggested that the developmental process depends on a succession of stimuli, and "that each historic stage in the evolution of an organ is necessary as a stimulus to the development of the next succeeding stage, and that the reason for the extraordinary persistence, in embryonic life, of organs which are rudimentary and functionless in the adult, may be that the presence of such organs in the embryo is indispensable as a stimulus to the development of the permanent structures of the adult. Should this theory prove to be well founded, it will afford a ready and welcome explanation of many perplexing facts in the development of animals": MARSHALL, *Vertebrate Embryology*, p. 34.

The science of embryology has just passed a period characterized by great progress, arising from critical studies of the facts of individual development. Many memoirs of a high order have been published, covering a wide range of topics. The formation of ova and the fertilizing agents have been critically studied, and much light has been thrown on the process of fertilization; the segmentation of the egg has received careful attention, and the knowledge of the formation of germ-layers, tissues and organs has been greatly advanced. During this period great attention has been given to technique, or the methods of preparing tissues for study. The great problem is to bring tissues under observation, with the normal relations as little disturbed as possible, so that the prepared material will represent the conditions existing in life, and no others. One great danger is that pseudo-structures will be artificially formed by the action of the reagents. "Many of the most important elements of cell-structure are invisible in life, and can only be brought to view by means of suitable fixation, staining and clearing." This shows the great importance of methods to the investigator, and why the success of a research may depend so largely on the care exercised in the use of reagents, and the mechanical part of getting sections in shape for observation. Much of the work that was done at an earlier period has now been repeated with greater refinement of technique, and also more critical observation, with the result of changing much of it. The bane of this period has been the indulgence, often on a slender basis, of the speculative spirit. Nearly every memoir of any extent published during this period contains general considerations of a speculative nature. There is now a general call for investigators to show a more judicial spirit and greater conservatism in discussing the general questions in the light of individual facts.

The science is now entering a period characterized by experimenting upon the developing organism, and observing the changes it undergoes in response to changed surrounding conditions. This is with a view to study the physiology of the embryo. It is a very promising and fruitful field of research. The results already attained by this method of study have profoundly modified some of the current views regarding the egg, and the general nature of the developmental process. The work in embryology has heretofore necessarily been mainly confined to the morphological side. It was necessary first to work out the structure of the organism, and the steps in normal development, before the more complex question of physiological differentiation could be approached. That pioneer work on structural embryology is now done, and it is possible to begin on the other side. Hereafter the morphological and physiological study of the embryo can go hand in hand to the benefit of both.

The basis upon which the experimentation rests should first be made clear. Let it be borne in mind that it is the living substance, or protoplasm, that is experimented upon. This is the only thing about the organism that is capable of responding, in the physiological sense, to external conditions. This living substance (idioplasm) is incessantly active; it is the substratum within which all vital processes, adult and embryonic, take place, and it is the substance, *par excellence*, that engages the attention of biologists. They have long since learned

that one of its chief characteristics is its responsiveness. While protoplasm exhibits a group of vital properties, the most remarkable is, that it is impressionable, and responds to external influences, changing its own peculiar vital activities in response to external conditions. The nature of these responses is mainly in the line of adjustments.

In order to come to closer terms with this living substance, and determine its normal activities and capabilities, it must be observed under all possible conditions. It is obvious that the behavior of the idioplasm, when subjected to experimentation, may throw important light on its properties and functions. In its responses to external influences two sets of conditions are involved: the activities displayed in the protoplasm itself and the external causes by which these are modified. The former may be spoken of as the internal activities, and the latter as the external agencies. Between the two there is constant reaction, and it is evident that the life of the organism must be a series of continuous adjustments of the internal conditions to the external conditions. Many illustrations of the fact that the internal activities of protoplasm are directly influenced by external causes might be given, but a single one, based on recent experiments, will suffice. Loeb, (1892) placed fertilized eggs, that develop normally in sea-water, under slightly changed conditions. He increased the usual quantity of salt (NaCl) in the sea-water, and observed that the usual course of segmentation was interfered with. Under normal conditions, the protoplasm of the egg divides with the nucleus, and there are formed as many blastomeres as there are nuclei. In this slightly changed medium, however, the protoplasm of the nucleus (which is more active) undergoes segmentation while the cell-protoplasm remains undivided. There results a number of nuclei, distributed in unsegmented cytoplasm. If, now, the eggs in this condition are transferred to normal sea-water, the protoplasm of the cell very quickly splits into as many parts as there are nuclei. The presence of a larger quantity of salt than usual operates to reduce the irritability of the protoplasm of the egg (by reducing the amount of water contained in it), so that the stimulus to cleavage proceeding from the nucleus is not sufficient to dominate it, but as soon as the irritability is restored, by reducing the sea-water to a normal condition, then the stimulus tending to produce segmentation becomes effective. The effect of the salt is, not to destroy, but to suspend, the cleavage phenomena.

This shows that the protoplasm is acted upon by outside conditions, but is not a new point, since it was demonstrated by actual experiment, as long ago as 1882, that external forces influence directly embryological phenomena. From this date onward the results of experiments on eggs and embryos have been published in steadily increasing numbers. Within the past five or six years the field has been extensively cultivated. Pflüger and Roux were among the pioneers in this line of investigation. The former, in 1883, 1884 and 1885, published researches founded on experiments on frogs' eggs, with a view to determine the influence of gravitation on cleavage, and, also, to decide whether there is a prearranged relationship of the parts of the egg to the future embryo. On the latter point, he came to the conclusion that "the essential elements of an egg have no more prearranged relationship in position to the parts of the future embryo than do snowflakes to the avalanche they may give rise to." Born (1885) and Roux (1885), independently, experimented on the effects of gravitation on the cleavage planes, with the result of showing that its influence is insignificant, and segmentation is controlled by a power resident in the protoplasm of the egg. Roux made extensive experiments, that were published in 1887 and 1888, on the effects of mechanical injury to the eggs. He claims that the first-formed blastomeres are specialized, so that, when one blastomere of the two-cell stage is killed, the remaining cell is incapable of regenerating the other half of the embryo, but that development is carried on, and a one-half embryo is produced. He expresses the conclusion that the first four blastomeres are necessary to the building of the quadrants (right and left, anterior and posterior) of the embryo, and that the development generally proceeds like mosaic-work. The ovum is, to his mind, made up of predetermined organ-forming areas, or specialized parts definitely arranged. This is, of course, contrary to the conclusions of Pflüger, mentioned above, and also to those of most recent experimenters. According to the experiments of Hertwig and Driesch, a symmetrical, but smaller, embryo may develop from one of the first four blastomeres, and therefore they are equivalent, and not specialized. This difference in experimental results as to what may arise from a partial ovum has made the question a perplexing one. Morgan (1895) has thrown light on the matter by showing that the position of the egg makes a difference in the resulting form. In his experiments of separating the first two blastomeres, in most cases small whole embryos were formed when eggs were fixed upside down, and one-half embryos resulted when the eggs were in a normal position. Oscar Hertwig has, individually, made numerous experiments along this line, and with his brother Richard has experimented on the behavior of sea-urchin eggs toward heat, poisons and mechanical injury. In this country important experiments have been made by Loeb, E. B. Wilson, Morgan and others.

The experiments already made may be grouped, according to the nature of the agencies involved, as mechanical, thermal, luminous and chemical.

Those depending on mechanical causes involve the influence of gravitation, pressure, removal of part of the egg by shaking, extirpation, or other means, cutting or destroying the connection of the embryo with the germ-ring, etc. Most of the experiments already mentioned fall in this category. Morgan, in 1892, repeated Kastschenko's experiment of cutting the connection of the fish-embryo with the germ-ring, and found that it continued to lengthen, thereby showing that the germ-ring material is not indispensable to the growth of the embryo, as is assumed in the theory of concrescence.

It was long ago observed that the effect of increasing the temperature within certain limits is to in-

crease the rate of development, and that lowering the temperature has the opposite effect. Temperature is also known to exert a directive influence on the germinal epithelium. As already indicated, the cells of the germinal epithelium are, at first, neither of the maternal or paternal type. An increased temperature has the effect of producing a larger percentage of female forms. Castle and Davenport (1895) have thrown light on the capabilities of protoplasm by showing that simple organisms, like *Protozoa* and tadpoles, may gradually be accustomed to high temperatures, and come to live in temperatures that would at first kill them. This is a good illustration of the adaptability of protoplasm. It acquires, gradually, a resisting power to high temperatures by responding to changed external conditions.

One illustration of the influence of light may be taken from physiological morphology. Cunningham experimented with flat fishes,—flounder, plaice and sole,—which are well known to be pigmented on the upper side, but white on the surface in contact with the bottom. He showed that the absence of pigment is due to the absence of light, and that it may be gradually formed on the lower side if that surface be made to receive the light. He arranged a mirror so that the light would be reflected on the under side of some of these fishes living in a tank with a glass bottom, and found that under the influence of light pigment was gradually formed.

Among the most noteworthy experiments yet published are those of Herbst, who observed the effect of slight changes in the chemical environment. Taking eggs that normally develop in sea-water, he found, by dissolving small quantities of different chemical substances in the water, that the organisms were profoundly influenced. He used, among other substances, the chloride, bromide, nitrate and sulphate of lithium, potassium and sodium, and experimented with eggs of sea-urchins. It is a well-known fact that the sea-urchin, in developing, builds up an immediate form (pluteus) with three long arms, which are supported by an internal skeleton of calcareous spicules. Of course this skeleton is derived from the lime-salts in the sea-water. The lime is probably taken out as a sulphate, and, by chemical processes within the protoplasm, is converted into carbonate of lime, and built into the supporting skeleton. If, now, a small quantity of lithium salt (carbonate or chloride) is added to the otherwise normal sea-water, a very different larval form arises. These salts apparently inhibit the power of the protoplasm to take up and transform the lime from the sea-water, and as there is not sufficient lime to construct an internal skeleton for the support of the arms, they are not developed. The resulting larva, instead of being like that of the normal sea-urchin, is like that of an entirely different animal, namely, tornaria. It is now to be observed that this great change is brought about by a very slight difference in the chemical environment, and leads to the conclusion that whole sets of organs may depend on the presence or absence of an apparently insignificant amount of substance.

But even more striking changes have been observed by Herbst. Embryologists have felt assured, until very recently, that the formation of the germ-layers was a fundamental feature of development that could not be altered by any external influence. The conception was, that this process depended on an inflexible and inherent law of development, which was too well established to be altered by external influences, but Herbst's experiments show that a slight change in the environment may produce changes even in the germ-layers. With lithium salts an embryo was sometimes formed with no endoderm (exogastrula), thus producing a change in the formation of the primary germ-layers. The action is very subtle. Eggs removed from the lithium solution may continue to develop along the abnormal direction. The first question to present itself is, How are these changes produced? and it can be answered in a general way by saying, that the protoplasm responds in a very intricate way to its surroundings. This raises the question, May not the whole developmental process depend upon physiological responses to stimulations that come from without? Herbst believes that the formation of organs can best be explained in this way. And there are many facts to support such an assumption. He thinks that the cells and organs in the embryo move and change form in response to various stimuli. "The migration of the nuclei to the surface of an insect's egg may be due to the response of the nuclei to the more abundant oxygen near the surface of the egg." "In later stages the collecting of mesenchyme cells to coat-nerves and blood-vessels may be due to migrations under the influence of directive stimuli."

That physiological stimuli may produce movement of a large mass is shown by Wheeler's interesting observations on the migrations of the embryo of the grasshopper. The eggs of this animal contain a considerable quantity of yolk. The embryo is formed first on the ventral surface of the egg, but it soon leaves this position and appears on the dorsal surface. It actually sinks down into the yolk and passes through to the dorsal surface. It does not remain there long, but subsequently travels round the end of the egg and comes to lie again on the ventral surface. This is a remarkable mass-migration, and is explained as of physiological use to the embryo. "The rapidly growing embryo, feeding upon the yolk, must give off waste-products that might accumulate in the adjacent yolk. Hence it would be of advantage if the embryo could move away to yolk not so contaminated."

The experimental method in embryology is very valuable, and much is to be hoped from this line of research. . . . However, too much has been claimed for it by some of its votaries,—namely, that it is to supersede the studies in ontogeny, and reduce that work to a low level; but it should rather be regarded as a valuable adjunct to structural embryology, to supplement it, in some ways to direct it, and to afford a check on some of its interpretations.

The next important line of advance to consider is that arising from critical study into the phenomena of cell-life. This, also, is a very important and essential line of investigation in embryology, as will appear from the following consideration. The

starting-point of all higher organisms is a fertilized ovum which contains the hereditary mechanism, and potentially all the structure of the adult. In order to get closer to the basal problems of development, embryologists have been obliged to study cells, in hopes of determining more accurately the nature of the hereditary basis, and also the precise origin of the germ-layers. Cytology, which deals with the internal phenomena of cell-life, has been wonderfully advanced within the past few years. Cellular studies have very extensively occupied the attention of both embryologists and biologists, more broadly speaking, since on closer scrutiny it appears that the interpretation of biological problems depends largely on a deeper knowledge of the minute structure and behavior of pototoplasm within the cell.

The embryologist finds it necessary to study the origin of the germinal elements. He finds within the body of a growing, miniature organism a group of cells that are in origin like those of the rest of the body. They have, however, different potentialities, and are destined to give rise either to egg-cells or sperm-cells. These aggregations occupy a position on each side of the middle plane of the dorsal wall of the body cavity, and form on each side a ridge named the germinal ridge. Certain cells of this ridge are modified, constituting the primitive egg-cells. It is an interesting fact that these cells are at first of an indifferent order. While it is early known from their position that they will go to form germinal elements, it cannot, for a considerable time, be told whether they will be of the maternal or the paternal type. They have the possibility of taking either direction, and whether they become egg-cells or fertilizing agents depends apparently on external causes operating as stimuli.

Wilson, in his recently (1895) published *Atlas of the Fertilization and Karyokenesis of the Ovum*, gives such a clear and concise account of the essential feature of the germ-cells that I quote the following three paragraphs:

"Since the establishment of the cell-theory by Schleiden and Schwann in 1838–40, the animal ovum has been recognized as being morphologically a single cell, consisting essentially of a mass of protoplasm (cytoplasm) containing a nucleus, and hence morphologically equivalent to any one of the tissue-cells of which the body is composed. The multicellular body is derived from the ovum by a series of successive divisions or cleavages, the egg-cell dividing into two, four, eight, and so on, in more or less regular geometrical progression, until a very large number of cells are produced. These cells, known in their earlier stages as blastomeres, are ultimately differentiated into the elements of the tissues, and among their descendants a certain number assume the character of the original egg-cell, are converted into ova, and thus form the point of departure for the following generation. Every egg is therefore derived from a continuous and unbroken series of cell-divisions from the egg of the preceding generation, and so on backward through all preceding generations; it is normally destined to form the first term in series of cell-divisions extending indefinitely forward into the future."

"In some exceptional cases (parthenogenesis) the egg is capable of initiating this series of cell-divisions without the influence of a male element. In sexual reproduction, however, which includes all ordinary cases, both among plants and animals, the egg is incapable of division until it has been fertilized, that is, acted on by an element derived from the opposite sex, known as the sperm-cell, or spermatozoön. The spermatozoön differs very widely from the ovum in appearance, being extremely minute, and provided, in most cases, with a long vibratile tail, or flagellum, by means of which it swims rapidly about. For this latter reason it was long regarded as a parasitic animalcule or infusorian. Not long after the promulgation of the cell-theory, however, it was shown that the spermatozoön, like the ovum, is a single cell, consisting of nucleus and cytoplasm, and that it has a like origin, being derived by division from cells pre-exising in the parent body. Inheritance is therefore effected in both sexes by means of cells, and the mechanism of heredity transmission is to be sought in cell-structure."

"*Fertilization.* Broadly speaking, fertilization consists in the union of a single spermatozoön with a single ovum, after which the process of division or cleavage immediately begins. It is true that in many cases—for example, in the shark, the butterfly, the earthworm, the newt—two or more spermatozoa may enter the egg. All the evidence goes to show, however, that even in this case, if development be normal, only one spermatozoön plays an active part, while the others are passive, and sooner or later perish and are absorbed. The fertilized ovum, or oösperm, is therefore the result of the fusion of two germ-cells derived from the two respective sexes. And since each parent contributes a single germ-cell only to the formation of the embryo, it follows that a single cell is capable of carrying with it the potential sum-total of hereditary characteristics, or stirp, of the parents. The study of the internal changes accompanying fertilization therefore leads directly to an inquiry into the mechanism of inheritance, and our study of these changes cannot be too precise or detailed."

"The first discovery regarding the internal phenomena of fertilization was made by Oscar Hertwig in 1875, in the egg of the sea-urchin. Hertwig determined the fact, namely, that the nucleus of the spermatozoön, or 'sperm-nucleus,' unites with the 'egg-nucleus' to form a single 'cleavage-nucleus,' which is the parent of all the nuclei of the embryo. This discovery soon extended to other animals, and to plants as well, and gave rise to the view, advocated by Hertwig, Strassburger, Kölliker, Weismann and many others, that the nucleus substance, or chromatin (so named by Flemming), is the most essential element in the germ-cell, and must be regarded as the physical basis of inheritance."

"*Chromosomes.* The analysis was pushed a step further in the year 1883, by Edouard Van Beneden, whose discoveries, originally made in the case of the threadworm *Ascaris*, were confirmed and extended to many other animals by Boveri, Strassburger and others. These discoveries related to the internal structure of the nuclei themselves. In all cases the

sperm-nucleus is at first very much smaller than the egg-nucleus, so that at first sight a marked inequality seems to exist between the two sexes in this respect. Van Beneden, however, determined the remarkable fact that during fertilization the inequality totally disappears, and the two nuclei finally exhibit a precise morphological similarity, as follows: Before or during their union each of them is transformed into a definite number of rodlike bodies, known as *chromosomes* (Waldeyer), *which are of the same form, size and number in the two sexes.* Both their form and their number differ in different species, but there is strong reason to believe that they are always constant in the same species throughout the animal kingdom."

"These facts justify the conclusion that the nuclei of the two germ-cells are, in a morphological sense, precisely equivalent, and they lend strong support to Hertwig's identification of the nucleus as the bearer of hereditary qualities. The precise equivalence of the chromosomes, contributed by the two sexes, is a physical correlative of the fact that the two sexes play, on the whole, equal parts in hereditary transmission, and it seems to show that the chromosomal substance, the chromatin, is to be regarded as the physical basis of inheritance."

Above, it was stated that the formation of egg-cells and sperm-cells is substantially the same. We shall now examine the formation of the sperm-cells, as described in 1892 by Vom Rath for the mole-cricket, and contrast this with the steps in the maturation of the egg-cell. The number of chromosomes in the nuclei of this animal is 12. Within the spermary are modified cells, called primitive sex-cells, which are destined to be converted into spermatozoa. They undergo repeated division, and the products are known as sperm mother-cells. In the process of forming the latter, the number of chromosomes has become doubled, so that in the case of the mole-cricket there are now 24 chromosomes in the nucleus of each sperm-mother-cell (Fig. X, B). The sperm-mother-cell now divides into two daughter-cells (C), but in this division the chromosomes are reduced to 12, the normal number characteristic of this species. The two daughter-cells immediately divide, giving rise to four sperm-cells (D), each containing six chromosomes. This reduction of chromosomes is very remarkable, and the process by means of which it is accomplished is called reducing-division. In ordinary cases of tissue-cell division it does not occur, but, on the contrary, the number of chromosomes is conserved by a longitudinal splitting of the rods, so that each nucleus contains the number characteristic of the species. It is to be noted that each sperm-mother-cell has given rise to four sperm-cells, and in the nucleus of each there is one half the number of chromosomes in the tissue-cells of the animal. These are immature sperms, and in the majority of cases the protoplasm of the cell becomes enormously elongated to form a vibratile thread, or tail, while the nucleus with the chromosomes becomes the head.

The formation of the egg in the same animal would embrace a similar series of steps. The starting-point, as in the case of the sperm, would be a primitive sex-cell, precisely similar to that giving rise to the sperm. This would be converted into an egg-mother-cell containing twenty-four chromosomes. "The egg-mother-cell does not immediately undergo division, but remains passive and increases, often enormously, in size by absorption of nutriment from surrounding parts; in this way each egg-mother-cell becomes an *ovum.* The ovum is therefore a modified cell, differing from others in size, due to the accumulation of non-living nutrient matter."

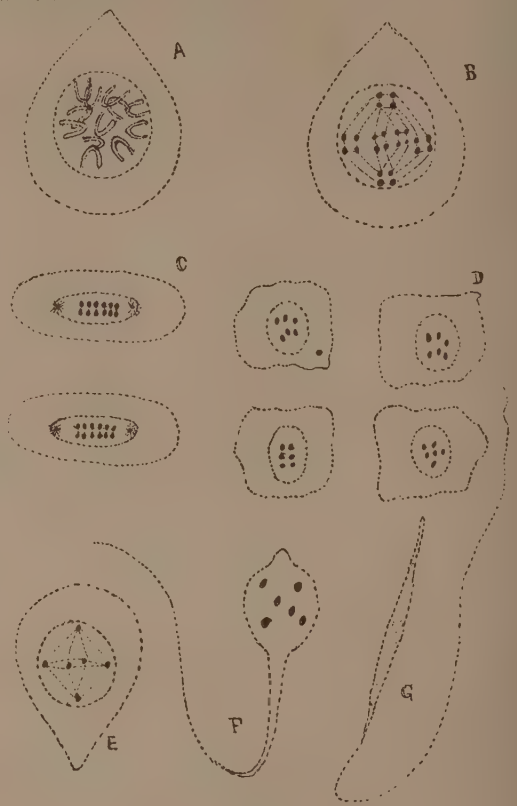


Fig. 1.

Fig. 1. Formation of sperm in the mole-cricket (after Vom Rath, from Parker's *Biology*). A. Primitive sex-cell, with twelve chromosomes. B. Sperm-mother-cell, with 24 chromosomes. C. Daughter-cells, each containing 12 chromosomes. D. Four sperm-cells, each with six chromosomes. E. A single sperm-cell about to elongate to form a sperm. F. Immature sperm, six chromosomes visible in the head. G. Fully formed sperm.

There follows now, in the history of the egg, a series of cell-divisions that correspond to those already described for the sperm. These are diagrammatically represented in Fig. 2. In the process of getting ripe or mature, the nucleus of the egg approaches the periphery, and undergoes division by the reducing process, leaving, on the outside, one half its chromatic substance, in the form of a globule, and retaining the other half within the egg (Fig. 2, C). In ordinary cases, this process is repeated on the part of the nucleus remaining within the egg, and a second globule is extruded. This is formed, also, by reducing-division, and there-

fore, contains six chromosomes (D). This series of steps is called the extrusion of the polar bodies, and, at its completion, the nucleus of the egg contains six chromosomes—one half the number characteristic of the species. In some cases, the first-formed polar body undergoes division outside the egg, giving rise to two cells, each having six chromosomes (E). An examination of the diagrams (Fig. 2, C, D, E) will show us that there have been produced, by all these steps, four nuclei, each containing six chromosomes. Three of these are without the egg and the fourth is the internal nucleus of the egg, surrounded by a large quantity of non-essential yolk-material. The presence of yolk in the egg should not mask the fact that this is a case of un-

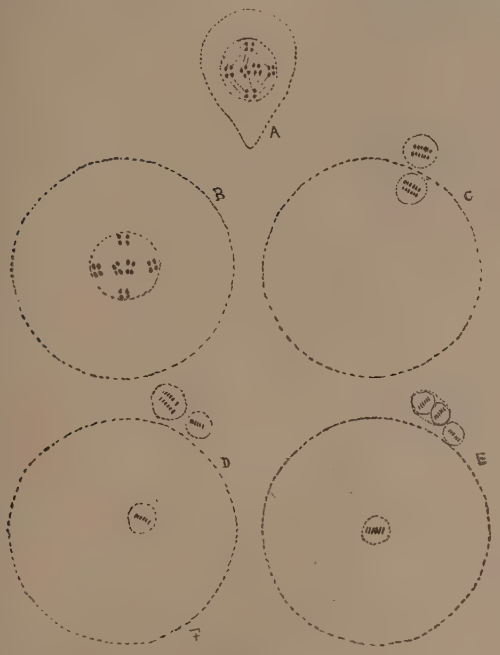


Fig. 2.

Fig. 2. Diagrammatic representation of the formation of an ovum in an animal with the same number of chromosomes as the mole-cricket. A. Egg-mother-cell corresponds to B in Fig. 1. B. Immature egg with nucleus containing 24 chromosomes surrounded by yolk-material; yolk not represented. C. Extrusion of first polar body, containing 12 chromosomes. D. After the formation of the second polar body, containing six chromosomes. E. The first polar body has divided, giving three nuclei, each containing six chromosomes outside the egg; the egg-nucleus likewise contains six chromosomes.

equal cell-division. The products are equivalent as far as chromatin is concerned, but one of the cells—the egg—is much larger than the others, on account of the accumulation of yolk. It is also to be noted that the egg-nucleus is now in the same condition as the sperm-nucleus, containing one half the number of chromosomes characteristic of the species. In fertilization the two come together and the normal number is restored.

This extrusion of polar bodies has usually been regarded as a habit acquired by the egg-cell to prevent the occurrence of parthenogenesis, to render fertilization necessary and secure the benefits of cross-fertilization, which are known to be so advantageous to both animals and plants. A comprehensive examination of fertilization in plants and animals shows that it does not uniformly occur even in those eggs from which two polar globules are extruded. At first, parthenogenetic development was supposed to be confined to eggs in which the extrusion of a single polar body has been observed; but it is now known, by direct observation, that the eggs of the gipsy-moth and the drone bee are capable of independent development after two polar globules have been extruded. We are thus driven to modify our conceptions of fertilization. It conforms more with the known facts, to regard fertilization as highly advantageous, and occurring in the normal course of events, but not absolutely essential in all cases and in every generation, even in those eggs that extrude two polar bodies. The formation of the polar bodies is a case of repeated cell-division, and we may regard the nucleus as brought to a condition of exhaustion, making an accession of chromatin from an outside source necessary, in the majority of cases, in order to produce a rejuvenescence of the protoplasm and inaugurate segmentation. Maupas and others have shown, by experiments with protozoa, that cell-division cannot be kept up indefinitely. Although the nourishing material may be abundant and of the proper sort, after a succession of independent divisions the protoplasm begins to show signs of general weakness, and after a time further division becomes impossible without fortification, through conjugation and exchange of chromatin with another individual. This is very suggestive, in connection with the question of fertilization in higher animals. The most widely accepted view is, that the protoplasm of the nucleus has been brought to a state of exhaustion, the normal number of chromosomes has also been reduced, and the entrance of the spermatozoön effects a rejuvenescence as well as a restoration of the chromosomes to their normal number. This is the preliminary step to egg-cleavage.

Another very recent view regarding fertilization is that the centrosome, which is present in cells, is to be regarded as a dynamic element by means of which is originated the power of cell-division. There is considerable divergence of opinion regarding the nature and source of the centrosome. E. B. Wilson shows that in the sea-urchin's egg it is derived from the middle part of the spermatozoön. Other observers have traced its derivation to the ovum alone, or to both ovum and spermatozoön in different animals.

Since fertilization consists in the addition of the paternal element to the maternal cell, the transmission of parental characteristics presumably depends on this union, and fertilization is an extremely important factor in the discussion of heredity (q.v., in these Supplements).

Cell-Lineage. The lack of agreement in the observations of different investigators regarding the origin of the germ-layers, especially the mesoderm, made it necessary to study more closely the early developmental stages before the establishment of the germ-layers The method of tracing cell-

lineage has been adopted as the only one that could lead to positive conclusions. In many instances the successive divisions of the egg have been traced without losing sight of any of them, and a consecutive history of the individual cells has been followed from the beginning of segmentation to the time when the germ-layers are established. Blochmann (1882) was a pioneer in this line of work. A number of American investigators have pursued studies in cell-lineage with great success. Whitman (1878 and 1887), *Clepsine;* Wilson (1892 and 1893), *Nereis;* Conklin (1890 and 1896), *Crepidula;* Kofoid (1894), *Limax;* Lillie (1895), *Unionidæ;* Mead (1895), *Chætopterus;* Castle (1896), *Ascidians*, *Cionia*.

Continued and critical studies have shown that there is a lack of uniformity in the origin of at least the mesoderm. This makes it apparent that the earlier generalizations of the germ-layer theory, regarding uniformity of origin and homologies of the germ-layers, and consequently of their derivatives, were too sweeping. Lillie and Conklin have shown that the very early stages of two different mollusks (*unio* and *crepidula*) agree, and then suddenly and unexpectedly depart in the formation of the middle germ-layer. In *crepidula*, Conklin shows that the mesoderm arises from elements (mesentoblasts) that are entodermal in nature. Lillie shows that the neuroblast in *unio* is traceable to a cell that is ectodermal in character. Castle, in his published studies of cell-lineage in tunicates (1896), considers that both ectoderm and entoderm unite in giving origin to the mesoderm, and these facts go to support the view that there is no absolute homology between the different layers. The question involves, of course, not only the origin, but the homologies, of the germ-layers, and therefore the germ-layer theory, which assumes a homology of the primary germ-layers from cœlenterates to mammals is to be taken with qualifications. It is doubtful whether there is a strict homology. Castle also shows that some of the longitudinal muscles (usually mesodermal derivatives) are derived from ectoderm along with the nervous system, while other muscles spring from entoderm. These studies in cell-lineage have thrown much light on the question of origin of the germ-layers, showing that there is not uniformity of origin of the middle germ-layer, and therefore no strict homology of its derivatives.

Organogeny. That department of embryology dealing with the development of organs (organogeny) has been greatly extended. Among the recent advances in this line, only a few of the most important may be summarily mentioned. Those that relate to the sense-organs and nervous system have been especially suggestive.

The embryological study of the sense-organs has led to the view that they are all derived from a sensory basis of an indifferent order, but of common origin (see SENSE-ORGANS, in these Supplements). There has also been discovered in vertebrates a set of rudimentary segmental sense-organs that are of transient existence, and the suggestion that these represent segmental sense-organs of the invertebrates has been accepted by many morphologists.

New and important discoveries have been made upon the development of nerve-fibers, that throw light on the physiology of nerves. His showed, in 1886, that the two sets of nerve-fibers in the spinal nerves have different origins. Those derived from the posterior root, or ganglionic nerve-fibers, arise in cells of the ganglia outside the central nervous system. These cells give rise to two nerve-fibers, one relatively short, passing inward to the central nervous system, and a longer one growing toward the periphery. The fibers of the anterior root arise from specialized cells (neuroblasts) within the central nervous axis, and grow outward. This shows that the physiological difference between the fibers of the posterior root and those of the anterior root has an anatomical basis in their different modes of origin. The nature of the ganglion ridge or neural crest, from which the fibers of the posterior root are developed, comes up in this connection. According to the hypothesis of Von Lenhossék, the ganglion ridge represents aggregations of primitively ectodermal cells that have migrated from the periphery.

The conception of the growth of the sensory nerves connected with peripheral sense-organs has been revolutionized. It has been shown, for instance, that the sensory fibers in the optic nerve arise in the retina and grow inward toward the brain, and that the fibers of the olfactory nerve have, likewise, their centers of nutrition (neuroblasts) in the peripheral epithelium of the organ of smell, and grow inward to the central nervous system. In fact, in all carefully investigated cases, it would appear that the special nerves of a sensory organ arise in the cells of that organ and grow toward the central nervous axis.

Recent embryological studies on the eye of vertebrates have brought out the fact of its extremely early appearance (see SENSE-ORGANS, in these Supplements), and throw much light on its probable phylogenetic history.

The ear, by embryology, has been traced into connection with the sense-organs of the lateral, and is looked upon as a very much modified canal-organ.

Much new work regarding the embryonic history of the brain has been done. Important discoveries have been made regarding the primitive brain of vertebrates, that tend to show that it was originally divided into similar segments, and that at least fourteen pairs of primary segments have been aggregated to make the brain of vertebrated animals. (See PRIMITIVE VERTEBRATE BRAIN, in these Supplements.)

It has been pointed out by Minot and others that animals develop according to two types, appearing in their younger stages either as larvæ or as embryos. The larval development is primitive, and the embryonic development, which depends on a large quantity of food-yolk, is secondary, and presents many modifications. Many questions of heredity and development can best be tested by study of larval forms, and the recognition of this point serves to indicate the importance of the study of larval forms, which has been too much neglected.

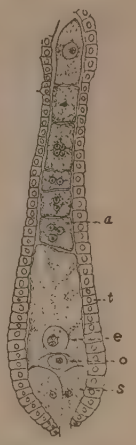
by embryologists. This offers a relatively new field for careful observation and experiment, and one from which much is to be hoped.

The account of the advances in embryology in the past ten years might be much extended and other topics treated, but the foregoing is sufficient to give some conception of the direction of progress, the characteristics of the science, and some of the more important topics that have been recently investigated. We observe that morphology owes many important discoveries to embryology. The tracing of organs in the process of becoming is very suggestive in elucidating their relations, and all of this study helps very much in coming nearer to a knowledge of vital processes and their relation to the external world, which is the aim of biological study.

Bibliography. The recent literature of embryology is very extended. Below is given a list of the best manuals and text-books in English, in which extended references will be found, and also the titles of papers especially referred to in this article. Lists of the pertinent literature will also be found in the papers mentioned. Dr. Minot's *Bibliography of Vertebrate Embryology* (1892) contains upward of three thousand titles. Balfour, *Comparative Embryology* (2 vols., 1880–85); Haddon, *Introduction to the Study of Embryology* (1887); Hertwig, *Text-Book of Embryology* (vertebrates), (trans. by Mark, 1892); Korschelt and Heider, *Text-Book of Embryology* (invertebrates), (Pt. I, trans. by Mark, 1895); Marshall, *Vertebrate Embryology* (1893). On methods: Whitman, *Methods in Microscopical Anatomy and Embryology* (1885); Lee, *The Microtomist's Vade-Mecum* (1892); Whitman, *Germ-Layers* (*Jour. Morph.*, 1887); *Morphology and Physiology* (*Amer. Nat.*, 1892); Wilson, *Cell-Lineage* (*Jour. Morph.*, 1892, 1893); *Embryology and Homology* (Biolog. Lects. Wood's Holl, 1894); Amphioxus, *Anat. Anz.* (1892); *Atlas of Fertilization* (1895); Andrews, *Reviews of Embryological Literature* (*Am. Nat.*, 1890–96); Pflüger, *Cleavage and Gravitation* (*Archiv. für Phys.*, 1883); *Relation of Embryo to Cleavage-Planes* (*Archiv. für Phys.*, 1884;) Born, *Gravitation and Cleavage* (*Archiv. für Mik. Anat.*, 1885); Roux, *Mechanism of Development* (*Bresl. Anz. Zeitschr.*, 1884); Mechanical injury: Virchow's *Archiv.* (1888); Hertwig, *Experimental Studies* (*Jen. Zeitschr.*, 1890); Vom Rath, *Spermatogenesis* (*Archiv. für Mik. Anat.*, 1892); Morgan, *Experimental Studies* (1895); Cunningham, *Influence of Light* (Fisheries of United Kingdom, 1894); Castle and Davenport, *Temperature* (*Archiv. für Entwick. Mechan. der Org.*, 1895); Wheeler, *Insect Embryology* (*Journ. Morph.*, 1893); Conklin, *Cleavage* (*Zoöl. Anz.*, 1890); Castle, *Germ-Layers*, *Ascidians*, (*Bull. Mus. Comp. Zoöl.*, 1896); Lillie, *Cell-Lineage* (1895); Kofoid, *Cell-Lineage* (*Proceed. Am. Academy*, 1894); Mead, *Cell-Lineage* (*Jour. Morph.*, 1895); His, *Nerve-Fibres* (*His's Archiv.*, 1878); *Neuroblasts* (*His's Archiv.*, 1889).

WILLIAM A. LOCY.

EMBRYO-SAC, in botany, a term applied to the cell of the ovule in which the embryo of the seed-plants develops. A study of the morphology of the lower plants has shown that the "embryo-sac" is a spore (macrospore), which is not shed from its sporangium (the ovule). The fact that the spore is not shed, but germinates within its sporangium, has led to the formation of "the seed." This macrospore (embryo-sac), in its germination, develops the female gametophyte, which is reduced so much that it does not leave the spore which produces it. Its normal embryogeny is as follows: The single nucleus of the macrospore divides, and the two resulting nuclei pass one to each end of the spore. These polar nuclei next pass through successive divisions, until four nuclei are formed in each end of the spore. One of these four polar nuclei in each end next moves toward the center and fuses with its fellow, forming the "endosperm nucleus." This ordinarily completes the structure of the gametophyte before fertilization, which, therefore, ordinarily consists of seven cells—three at the micropylar end, the central one being the *oösphere*, which is to be fertilized and form the embryo of the sporophyte, the other two the *synergidæ*, the three together constituting the "egg-apparatus"; three at the antipodal end, known as the *antipodal cells;* and one more or less centrally placed, the *endosperm nucleus*, which, by its subsequent divisions, gives rise to the endosperm of the seed. The accompanying figure clearly shows the relation of these parts.



Embryo-Sac of *Aster Novæ Angliæ*, showing: *t*, tapetal layer; *s*, two *synergidæ*; *o*, *oösphere*; *e*, endosperm nucleus, *a*, six antipodal cells; *o* and *s* together form the egg-apparatus. (Original.)

EMBURY, PHILIP, an American preacher; born in Ireland in 1729. He joined Wesley's Society, became a local preacher in 1758, and, emigrating in 1760 to New York, in 1766 began to hold services there. He probably presided over the first Methodist congregations formed in the United States. The first Methodist Church was built under his charge in 1768, and he afterward preached there gratuitously. Embury went to Salem, New York, in 1769, where he preached on Sunday, and worked as a carpenter during the week. He organized the first Methodist society within the bounds of what is now Troy Conference. He died in Camden, New York, in August, 1775.

EMERALD BIRD OF PARADISE (*Paradisea apoda*), the most beautiful of the birds of paradise. See BIRDS OF PARADISE, Vol. III, p. 778.

EMERSON, RALPH WALDO, an American essayist, poet and philosopher; born in Boston, Massachusetts, May 25, 1803; died in Concord, Massachusetts, April 27, 1882. For three generations his paternal ancestors were New England clergymen, and, after graduating at Harvard College in 1821, he himself entered the church, and for a brief time was pastor of the Second Unitarian Church, Boston. In consequence of holding views respecting the ordinance of the Lord's Supper at variance with those of his congregation, he sundered his connection with the church, and, retiring to Concord, abandoned the church as a profession. In 1830 he married; but his wife died in the following year, and, his own health not being robust, he spent the next two years in Europe. In Britain he met Coleridge, Wordsworth, Landor and De Quincey, and formed with Carlyle one of the most interesting friendships in literary annals,—a

RALPH W. EMERSON.

friendship that in many ways was an important epoch in the lives of the two men. In 1834 Emerson returned to the United States, and at once devoted himself to lecturing and to the varied life of a literary man. In the following year he again married, and settled down at Concord, Massachusetts, which was to become his permanent home, leaving it only occasionally on his lecturing tours, and, later in life, for a second visit to England. The themes of his lectures and addresses are varied, his prelections being on human life, culture, character, history, and the philosophy of history, the substance of not a little of which was afterward reproduced in his collected essays. (See AMERICAN LITERATURE, Vol. I, pp. 729–733.)

In 1836 Emerson published *Nature: An Essay*, the first of a notable series of thoughtful, inspiring volumes, whose elevated tone and suggestive though somewhat desultory matter gave an impetus, among his admirers on both sides of the Atlantic, to pure living and high thinking. This was followed by two volumes of essays (first series, 1841; second series, 1847) and by a collection of poems. From the outset of his career he became an exponent of transcendentalist views, and early formed intimacies with William Ellery Channing, Theodore Parker, Bronson Alcott, Thoreau and Margaret Fuller. With the latter he was associated, from 1840 to 1844, in editing *The Dial*, a magazine of literature, transcendental philosophy and religion. In 1850 appeared *Representative Men*, in which he dealt with such class-types as Plato, Swedenborg, Montaigne, Shakespeare, Napoleon and Goethe. A *Memoir of Margaret Fuller*, Marchioness d' Ossoli, appeared in 1852, and *English Traits*, a series of impressions of English characteristics rather than of characters, with autobiographical fragments, in 1856. These were followed successively by *The Conduct of Life* (1860); an *Oration on the Death of President Lincoln* (1865); *May-Day, and Other Pieces*, in verse (1867); *Society and Solitude* (1870); and *Letters and Social Aims* (1875). A further collection of poems appeared in 1876, while at various times he issued many miscellaneous products of his pen, including *Parnassus*, an anthology of verse, and an introduction to Professor Goodwin's translation of *Plutarch's Morals*. To these must be added *Letters to Thomas Carlyle*, extending through many years, and posthumously published.

Emerson's collected writings embrace 12 volumes, including his poems and lectures, among the latter of which are several, delivered during the Civil War, on the abolition of slavery. The authoritative biographies of Emerson are those by James Elliot Cabot, Emerson's literary executor, and Oliver Wendell Holmes.

Emerson's life was largely that of a literary recluse, if we except the occasions which called him to his public appearances in connection with lyceum lecturing. While possessing the keenest, most practical interest in public affairs, he knew comparatively little of the world of action, and his philosophy, often pantheistic in its form, if not in its tendency, and deeply tinged with mysticism, lacked the mundane robustness of thought which a bustling rather than a romantic age requires. His essays, though discursive, are uplifting and inspiring, their attractiveness consisting in their pure, exquisite diction, fine ethical beauty, charming idealism, quiet but rich wisdom, and noble serenity of mood. It is these qualities chiefly that have given distinction to Emerson's writings, and made him one of the most original and permanent forces in modern literature. His poetry has many of the characteristics of his prose, but should be read only in high and spiritually exalted moods.

G. MERCER ADAM.

EMERTON, EPHRAIM, an American educator and historian; born at Salem, Massachusetts, Feb. 18, 1851, and educated at Harvard, Berlin and Leipsic. In 1876 he became instructor in history at Harvard, and in 1882 was appointed professor of ecclesiastical history there. His works include *A Synopsis of the History of Continental Europe; Methods of Teaching History* (1885); and *An Introduction to the Study of Mediæval History* (1888, 1893).

EMIGRATION. See IMMIGRATION, in these Supplements.

EMIGRÉS. See FRANCE, Vol. IX, pp. 601 et seq.

EMILIA, a department of northern Italy, lying almost entirely between 44° and 45° N. lat., and comprising the former duchies of Parma, Modena and Massa-e-Carrara. It takes its name from the Via Æmiliana, an important military road built by the Romans. Situated almost entirely in the basin of the Adriatic, its climate is temperate and healthful. The chief products are maize, wheat, tobacco, fruit, wine, honey, hemp, silk and flax. Vine-culture is increasing rapidly. Large quantities of salt are taken from the lagoon of Comacchio; sulphur and very beautiful marble are exported. Area, 8,012 square miles; population 1891, 2,254,000.

EMINENCE, a town in Henry County, northern central Kentucky, 26 miles W. of Frankfort, on the Louisville and Nashville railroad, in a fine blue-grass region, where farming and stock-raising are carried on. There is a valuable mineral spring here, two colleges, and also woolen and flour mills. Population 1890, 1,002.

EMINENT DOMAIN, the sovereign right vested in the public, whereby private property may be taken or controlled for public use without the owner's consent. This right exists only when the property to be taken is necessary for public use or convenience. The right of eminent domain is vested in the state in which the property is situated, for all purposes except those for which the constitution of the United States confers the right upon the Federal government. The state has the power to delegate the right of eminent domain, and this power is exercised frequently by granting the right to railroad corporations and others engaged in work of public utility. The state legislature has sole power to determine the necessity of the improvement to be made, and for which the property is to be taken, and to designate the manner in which the right shall be exercised. The right may be delegated either by general act of the legislature conferring the right upon all persons and corporations engaged in business of a special public nature, or by special charter. But under no circumstances

can private property be taken for public use without full and adequate compensation to the owner. It is also a general rule that the compensation must actually be paid or tendered before the property can be taken. In England property required for public purposes is condemned by act of Parliament, the compensation to be paid to the owner being fixed by a jury, assessors, or under the provisions of the Lands Clauses Consolidation Acts.

EMIN PASHA, a German, whose real name was Eduard Schnitzer; born in 1840 at Oppeln, Silesia; educated at Neisse, and studied medicine at Breslau and Berlin. In 1864 he went to Turkey, where he quickly established a reputation as a physician. He accompanied Hakki Pasha on his official journeys through Armenia, Syria and Arabia. He went with Ismail, governor of Scutari, in his exile to Trebizond. He knew the Turkish and Arabic languages well, and had adopted the habits and customs of the people so completely that he readily passed for one of them. He adopted the name Emin, "the Faithful One," and upon the death of Ismail (who had been restored to royal favor), he married his widow. In 1876 he joined the Egyptian service, and was ordered to Khartoum, and thence as chief medical officer to the Equatorial Province, of which, in 1878, he was appointed governor by General Gordon. Here he was isolated and shut off from the world, and harassed by the troops of the Mahdi and by revolts instigated in the interest of the slave trade. In 1886 news was received in England that he was still holding his post in Central Africa, and an expedition under Stanley was sent to his relief. The expedition reached Emin in May, 1888. In August, while the expedition was looking for its rear guard, he was imprisoned by the natives, but escaped in December, and in February, 1889, rejoined Stanley, with whom he reached Zanzibar in December. Many honors were bestowed on him in Europe, and in 1890 he organized an expedition and returned to Africa. After lingering in the neighborhood of Lake Victoria he endeavored to penetrate the regions to the northwest; in 1892 he started for the Congo with a band of natives, and was murdered, Oct. 20, 1892.

EMMA, Queen Regent of the Netherlands (Adelaide Emma Wilhelmina Thérèse), was born Aug. 2, 1858, at Arolsen, the capital of Waldeck. She was married, Jan. 1, 1879, to the late William III of Holland, by whom she had one daughter. She accepted the regency a few days before her husband's death, Nov. 3, 1890, when she issued a proclamation declaring her sense of the responsibility which had devolved upon her.

EMMETSBURG, a railroad junction and capital of Palo Alto County, Iowa, on the Des Moines River, 55 miles N.W. of Fort Dodge, and on the Burlington, Cedar Rapids and Northern and Chicago, Milwaukee and St. Paul railroads. Flour and lumber are produced here. The town also has a packing-house, and an excellent water-supply. It has a large trade in the dairy products of the neighborhood. Population 1895, 2,104.

EMMETT, Daniel D., an American musician, noted as the author and composer of *Dixie*, the war-song of the South; born in Mount Vernon, Ohio, Oct. 29, 1815. His grandfather, an Irishman, served as chaplain and surgeon in the Revolutionary War. His father shouldered a musket in 1812 under General Hull, and later acted as an Indian scout in northern Ohio. Learning to play the violin and other instruments, Daniel Emmet, in 1843, organized the first minstrel troupe in the United States. His *Dixie Land*, which was to the gray-clad soldier what *John Brown's Body* was to his brother from the North, was written in 1859, when the author was a member of the then famous Bryant's Minstrels in New York. Emmett was asked one Saturday evening to compose a "hooray" chorus for the Monday performance. Sound and noise were the two desiderata, and from the first *Dixie* was a success. The keynote was love and longing for the Southland, and one bar of music set the key for the whole. Adopted as a march and war song in New Orleans, it was taken up by the populace and transferred to the battle-field. *Dixie* is as lively and popular an air to-day as when it was written, nor is its reputation confined to the American continent. It ranks with the finest of the world's simpler airs in touching the emotions.

EMMITTSBURG, a village of Frederick County, northwestern Maryland, one mile from Mason and Dixon's line. It was laid out by William Emmitt in 1773, and contains Mount St. Mary's Catholic College, St. Joseph's Academy, and the mother house of the Sisters of Charity in the United States. Its educational buildings are among the largest in Maryland. Population 1890, 844.

EMMONS, George Foster, an American naval officer; born in Rutland County, Vermont, Aug. 23, 1811. He entered the United States navy in 1828, became lieutenant in 1841 and commander in 1856. During the Civil War he commanded the *Hatteras*, *R. R. Cuyler* and *Lackawanna*, and captured many prizes. He became commodore in 1868, and rear-admiral in 1872. He was the author of *The Navy of the United States from 1775 to 1853*. He died July 2, 1884.

EMMONS, Nathanael, an American theologian; born at East Haddam, Connecticut, April 20, 1745. Educated at Yale College, he was licensed to preach in 1769. From 1773 to 1827 he was pastor at Franklin, Massachusetts, and during this long pastorate prepared 57 young men for the ministry. He was a founder and the first president of the Massachusetts Missionary Society. He published many essays, sermons and dissertations. His collected works, with a biography by Prof. E. A. Park, were published in six volumes in 1861. He died in Franklin, Massachusetts, Sept. 23, 1840.

EMMONS, Samuel Franklin, an American mineralogist; born in Boston, Massachusetts, March 29, 1841; graduated at Harvard in 1861, and studied in mining schools abroad. He had charge of the United States geological survey of Colorado in 1879, and wrote many papers on geology and mining. Among his published works were *Statistics and Technology of the Precious Metals* (1885) and *Geology and Mining Industries of Leadville, Colorado* (1886).

EMORY, a village of Washington County, western Virginia, 10 miles N.E. of Abingdon, on the

Norfolk and Western railroad. It was named after Bishop John Emory, and is the seat of Emory and Henry College. Population, 200.

EMORY, JOHN, an American Methodist Episcopal bishop; born in Queen Anne County, Maryland, April 11, 1789. In 1805 he began the practice of law, but in 1810 entered the Methodist Episcopal ministry. He was a delegate to the general conferences, with one exception, from 1816 to 1832. In 1820 he was sent to the British Wesleyan conference, and in 1832 was ordained a bishop. For a long time he managed the affairs of the Methodist Book Concern, and edited the *New York Christian Advocate*. He founded the *Methodist Quarterly Review*, and was active in the establishment of the University of New York, Wesleyan University and Dickinson College. Among his works are *The Divinity of Christ Vindicated;* and *Defense of Our Fathers*. He died at Reistertown, Maryland, Dec. 16, 1835.

EMORY, WILLIAM HEMSLEY, an American soldier; born in Queen Anne County, Maryland, Sept. 9, 1811. He graduated at West Point in 1831, became an engineer and artillerist, and was on General Kearny's staff during the Mexican War. In 1853 he was commissioner to run the boundary between the United States and Mexico under the Gadsden treaty. After several years' service in Utah and Kansas he resigned from the army May 9, 1861, but was re-commissioned as lieutenant-colonel of the Sixth Cavalry five days later, and took part in the Peninsular campaign. He became brigadier-general of volunteers in March, 1862, commanded a division under General Banks in Louisiana, and commanded the Nineteenth Army Corps in the Red River campaign in 1864, and later in the Shenandoah valley, where he successfully resisted Jubal A. Early. He received successive brevets, in the regular army, of brigadier-general and major-general, and became major-general of volunteers, Sept. 25, 1865. From 1865 to 1875 he held departmental commands, and he was retired in 1876 with the rank of brigadier-general. He died in Washington, District of Columbia, Dec. 1, 1887.

EMORY AND HENRY COLLEGE, an important educational institution at Emory, Washington County, Virginia, its organization dating from 1837. It possesses funds amounting to $225,000, the income from which, added to the tuition fees, produces an annual sum of $14,000 or more. The college is a valuable educational factor in the state. It is under the control of the Methodist Episcopal Church South.

EMORY TESTING-MACHINES. See STRENGTH OF MATERIALS, in these Supplements.

EMPEROR GOOSE OR PAINTED GOOSE. See GOOSE, Vol. X, p. 778.

EMPEROR MOTH, (*Saturnia pavonia minor*), a moth of the same family (*Bombycidæ*) with the silkworm moth. Its expanse of wings is about three and a half inches. Each wing is ornamented with a large, eye-like, glassy and transparent spot, and such spots are exhibited by many of the genus. It is the largest British moth.

EMPHYTEUSIS OR JUS EMPHYTEUTICUM. See ENTAIL, Vol. VIII, p. 451.

EMPIRE CITY, the capital of Coos County, southwestern Oregon, on Coos Bay, 130 miles S.W. of Salem. It exports excellent lignitic coal. Population, about 300.

EMPIRICAL FORMULÆ, symbols. See CHEMISTRY, Vol. V, p. 472.

EMPIRICISM, the dependence for knowledge or skill on experience or experiment, rather than on theory. See LOGIC, Vol. XIV, pp. 782, 792. For empiric school of medicine, see MEDICINE, Vol. XV, pp. 801 et seq.

EMPLOYERS' AND EMPLOYEES' LIABILITY. The relation of employer and employee is created by an agreement, either express or implied, that the employee shall render services for the employer under such circumstances as to be subject to the employer's control while engaged at his duties. If one engages to perform specified work for another without submitting himself to the control of the person for whom the work is done, but undertakes the responsibility himself of properly completing the work, the relation of employer and employee does not exist, and the party thus undertaking the performance of work is an independent contractor, and not an employee. This distinction is sometimes difficult to apply; but the general rule is, that the fact of control, or the right personally to direct the performance of the duties required, is the distinguishing mark of the relation of employer and employee. The law as to the liability of employer and employee frequently is conflicting and unsettled, and the reader must refer to some legal text-book on the subject of master and servant for a full discussion of any branch of the subject.

The law implies many duties of the employer in addition to those ordinarily expressed in a contract of employment, both in relation to the employee himself and to third persons. It may be stated as a general rule that the law will imply the duty on the part of the employer to furnish reasonably safe appliances for the use of his employees; to provide a reasonably safe place in which his work may be done; and to employ competent and skillful servants, and a sufficient number of them, so that the work may be done properly. A failure to use ordinary care in the performance of any of these duties is generally considered such negligence as will make the employer liable in damages to an employee who is thereby injured.

It is also a rule of law that the employer is bound to inform his employee of any dangers which may accompany the business for which he is employed, since the employer is presumed to know the dangers which attend such service. A mere general statement that the service is dangerous is not sufficient. But the employee is not bound to call attention to dangers which are the subject of common knowledge or could readily be seen by ordinary observation. If injury to an employee results from a latent defect in machinery or appliances which the employer could have observed by having proper inspections made, he will be held responsible therefor, even though he had no knowledge of such defect. These duties which the law imposes upon an employer cannot, as a rule, be delegated to another.

The fact that an employer engages a competent manager or superintendent, whom he instructs to perform these duties, generally does not relieve the employer in case such duties are not performed. There is, however, much conflict among the decisions on this question, and in some states it is held that certain of these duties are not personal to the employer, as, for example, in case the employer engages a competent superintendent whom he instructs to keep all machinery in good repair. In such cases it is held that if the superintendent fails to make needed repairs, whereby an employee is injured, the employer will not be held responsible for the default in duty. Before an employee can hold his employer liable for injury resulting from defect in machinery or appliances or some danger accompanying the work at which he is employed, he must use ordinary care to avoid the dangers which he knows to exist, and to ascertain the dangers which attend his work. He is obliged to report any defects which may come under his observation, and if within the line of his duties, make necessary repairs. He must use his senses; and if a defect is obvious or suggestive of danger, he will be presumed to have observed it, and under such circumstances will generally be required to use special precaution before he can hold his employer liable for resulting injury to him.

There is also a rule of law seriously affecting the question of liability of employers for injury occurring to an employee, known as the doctrine of common employment. The general rule is, that an employer is not responsible to his employees for injuries which they may sustain while engaged in his service, if such injury was caused by the neglect of a fellow servant or employee—that is, by an employee who is engaged in the same common or general employment. The principle upon which this rule is based is, that inasmuch as such employees have opportunity to advise and confer with each other as to the danger of neglecting their duty, and to report to their employer any tendency of any fellow-employee to neglect his duty, they therefore have the opportunity to prevent neglect, and cannot hold the employer responsible for injury sustained on that account. The application of the rule, however, is very difficult, because of confusion of the decisions of the courts in determining who are fellow-servants. It is not difficult to see that two brakemen on a train are fellow-servants, and therefore, if one is injured through the neglect of another, the employer is not liable. But as to whether a superintendent in a factory and a workman are fellow-servants within the meaning of this rule, the difficulty is greater. The superintendent in some respects represents the employer; and in so far as he acts in that capacity, he is not a fellow-servant, and the neglect of any duty delegated to him by the employer will not come under the rule of fellow-servants. If his neglect is of a duty which he performs in the capacity of a workman, the rule will apply. It can readily be seen that many fine distinctions arise under a rule of this kind, and reference must be made to a treatise on this subject for a full discussion.

The rule as to contributory negligence has an important bearing upon the right of an employee to demand compensation for damages sustained on account of injury. The rule generally stated is, that if an employee is injured by reason of a default of the employer in some of the duties which the law imposes upon him, as through failure to make proper repairs of defective machinery, yet if the employee contributes to the cause of the injury, through his failure to use ordinary care and caution, or by his willful wrong, so that the injury would not have occurred but for the combined fault of both, then the employee cannot recover any compensation for this injury.

As a general rule, a contract expressly relieving an employer from liability for failure to comply with the duties which the law imposes upon him is held to be against public policy, and is not enforceable. An employee is liable to his employer in case he makes contracts for his employer without authority, or exceeds the scope of his authority, and must pay the damages which result from his default in duty. He is also liable for damages resulting from his wrongful acts or neglect of duty. Many states have modified the rules as to the liability of employers and employees by statute, and such statutes, and the decisions of the courts of the state, must be consulted for accurate information as to the law of any particular state governing this subject.

EMPLOYERS' LIABILITY INSURANCE. See ACCIDENT AND CASUALTY INSURANCE IN THE UNITED STATES, in these Supplements.

EMPORIA, a flourishing city and the capital of Lyon County, central eastern Kansas, situated in a fine agricultural region, on the Neosho River, and on the Atchison, Topeka and Santa Fé and Missouri, Kansas and Texas railroads. It has a state normal school, the College of Emporia, a business college, conservatory of music, gas and electric lights, opera-house, water-works, street-railways and various manufactures, including that of canned goods, carriages and iron, and has marble-works. Population 1895, 8,225.

EMPORIUM, a railroad junction and county seat of Cameron County, northwestern central Pennsylvania, situated 99 miles N.W. of Williamsport, on the Pennsylvania railroad. It has a good lumber trade, and valuable salt-wells are found in the vicinity. Population 1890, 2,147.

EMPSON, SIR RICHARD, the unpopular agent of Henry VII. In 1491 he became Speaker of the House of Commons, and in 1504 was knighted, having been high steward of Cambridge University and chancellor of the duchy of Lancaster. Throughout Henry's reign he was employed with Edmund Dudley (q.v., in these Supplements) in exacting taxes and penalties due to the crown. His conduct was by the people regarded as infamous, and in the second year of Henry VIII's reign he was convicted of treason, attainted and beheaded on Tower Hill, Aug. 17, 1510.

EMS, a river in the northwestern part of Germany. It rises in Westphalia, at the southern base of the Teutoburger Wald, and, flowing first in a northwestern, and then through the province of Hanover in a northern direction, empties into Dollart

Bay. In 1818 it was connected by a canal with the Lippe, and thus with the Rhine.

EMU. See EMEU, Vol. VIII, pp. 171–173.

EMU-WREN (*Stipiturus malachurus*), a small bird of the thrush family found in Australia. The bird has long tail-feathers, which possess few barbs and resemble the feathers of the emu. It seldom flies, but usually progresses by running.

EMYDIDÆ, a family of turtles, which includes all of the so-called fresh-water forms. It is the largest family of the order *Chelonia*. Some of the species are almost as terrestrial as the land-turtles. Many of the species are of great value as food.

ENALIOSAURIANS, an order of marine reptiles which existed from Carboniferous through Cretaceous times. In general form they probably resembled the existing cetaceous mammals. The feet were paddle-like. Some animals reached a length of forty feet. The *Ichthyosaurus*, *Plesiosaurus* and *Nothosaurus* are typical representatives of the three families of the order.

ENAMELED LEATHER. See LEATHER, Vol. XIV, pp. 387, 388.

ENAREA, a country of Africa, south of Abyssinia, situated within lat. 7° to 9° N., long. 36° to 38° E., but its limits have not yet been ascertained definitely. It is inhabited by a portion of the Gallas tribes, who, owing to the continued communication which they keep up with Abyssinia, and also to the residence of many Mohammedan merchants among them, are civilized much more than the Gallas usually are. Their government is a hereditary and absolute monarchy. The principal rivers of Enarea are the Gibbe and the Dodesa. Its coffee-plantations are extensive. It is remarkable for its manufactures of ornamented arms, and of cloths with embroidered borders. Besides these, it exports slaves, gold, ivory, civet and skins into Abyssinia. The king and a small portion of the population are Mohammedans, and it is said that native Christians have been found in Enarea. The capital is Saka, near the river Gibbe. See also AFRICA, in these Supplements.

ENCALADA, MANUEL BLANCO, a Chilean soldier and statesman; born in Buenos Ayres, Argentine Republic, in 1790. In his youth he was taken to Spain, and studied in Madrid, and in the naval academy at Leon, but deserted the Spanish ranks and joined the Chilean party. In 1819 he became rear-admiral, in 1820 major-general of infantry, and in 1825 head of the army of Chile. He was for two months of 1826 President of the republic, and from 1847 to 1852 was the governor of Valparaiso. For the next five years he was Chilean minister to France. From that period until his death, which occurred in Santiago, Sept. 5, 1876, he was not again in political prominence.

ENCHORIAL OR DEMOTIC WRITING. See EGYPT, Vol. VII, p. 721.

ENCRATITES, a sect. See AQUARIANS, Vol. II, p. 217.

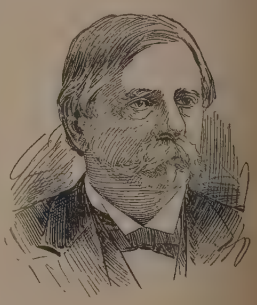
ENCRINAL OR ENCRINITAL LIMESTONE, a name given to some Carboniferous limestones, from the great abundance in them of the calcareous skeletons of encrinites. See also *Crinoidal Limestone*, under GEOLOGY, Vol. X, p. 238.

ENCRINITES, fossil crinoids, often known as stone lilies. See *Crinoidea*, under ECHINODERMATA, Vol. VII, pp. 635–638; and *Crinoidal Limestone*, under GEOLOGY, Vol. X, p. 238.

ENDEMIC, a term meaning peculiar to a certain region or people. It finds its most general application in the case of diseases which affect numbers of persons simultaneously, but so as to show a connection with localities as well as with their inhabitants. Endemic diseases are usually spoken of as contrasted with epidemic and sporadic, the first term indicating that a disease infects habitually the population within certain geographical limits, and also that it is incapable of being transferred or communicated beyond those limits; while, on the other hand, a disease is termed epidemic if it is transmitted without reference to locality, and sporadic if it occurs in isolated instances only. The most marked type of an endemic disease is ague, which has the characteristics mentioned above, and is to such a degree a denizen of particular tracts of country as to lead to their being, in some instances, almost depopulated. The term is also used of animals or plants, as opposed to exotic, that are peculiar to a certain region or country.

ENDICOTT, JOHN, a colonial governor of Massachusetts; born in 1589, in Dorchester, England. In 1628 he came to America and took charge as governor of the plantation at Naumkeag, now Salem, and continued to exercise the chief authority until the arrival of John Winthrop, who took charge in 1630. In 1641–44 he was deputy governor of Massachusetts Bay Colony, again in 1650 and in 1654, and was governor in 1644, 1649, 1650–53, and in 1655–65. In 1645 he became sergeant major-general of the colony, and in 1685 president of the colonial commissioners. John Endicott was one of the most fearless and energetic of the early Puritans. It was he who, in defiance of the law, established the first mint in the colony, and it is narrated that he ordered the removal from the military standard of the cross of St. George, regarding it an offensive emblem of Romanism. He died in Boston, March 15, 1665. See also QUAKERS, Vol. XX, p. 152.

ENDICOTT, WILLIAM CROWNINSHIELD, an American statesman, descendant of Governor John Endicott; born at Salem, Massachusetts, Nov. 19, 1827. He graduated at Harvard University in 1847; studied law for three years, and was admitted to the bar of Massachusetts in 1850. He continued in practice until 1873, when he was appointed by Governor Washburn to the bench of the Massachusetts supreme court. Ill health caused his resignation from the bench in 1882. He was Secretary of War under President Cleveland from 1885 to 1889. His daughter became the wife of Joseph Chamberlain of England.



WILLIAM C. ENDICOTT.

ENDLESS SCREWS. See *Screw*, under MECHANICS, Vol. XV, pp. 759, 760.

ENDLICHER, STEPHEN LADISLAUS, an Austrian botanist; born June 24, 1804, at Pressburg, Hungary. While a young man he entered the priesthood, which he abandoned in 1827, devoting himself to botanical and linguistic studies. In 1828 he was appointed director of the Imperial Library in Vienna, and, during the eight years in which he remained in this office, his time was chiefly devoted to the study of plants. He was put at the head of the Museum of Natural History in 1836, and in 1840 became professor of botany in the University of Vienna, which position he retained until his death. His botanical reputation depends almost wholly upon his monumental *Genera Plantarum*. His other works of value are *Iconographia Generum Plantarum* and *Synopsis Coniferarum*. He died by his own hand, in Vienna, March 28, 1849.

ENDOGENS, a name formerly applied to the great group of plants now known as monocotyledons. The name was given upon the supposition that the stem increased in diameter by the addition of new material within, in distinction to the "exogens" (dicotyledons), whose stems increased in diameter by the addition of material without, thus forming rings of growth. The name has been abandoned in this application, but the term *endogenous* is applied to a plant part or organ which originates within, rather than upon, another structure. For examples, root-branches are, as a rule, endogenous.

ENDOPHYTIC, a term applied to certain low plants that inhabit the tissues of higher plants, notably the *Cyanophyceæ*, or "blue-green algæ." Thus species of *Nostoc* are found in the tissues of certain liverworts, in the leaves of *sphagnum* mosses, and even in the stems of certain dicotyledons.

ENDOSMOSE AND EXOSMOSE. See OSMOSE, in these Supplements.

ENDOSPERM, a name applied to the nutritive tissue of the seed developed within the embryo-sac and outside of the embryo. In gymnosperms the endosperm is developed abundantly before fertilization; in angiosperms its development follows the act of fertilization; and in both cases it is considered to be the vegetative development of the female gametophyte, which thus nourishes the young sporophyte (the embryo). Similar nutritive tissue sometimes is developed within the seed outside of the embryo-sac, in which case it is known as *perisperm*. In the angiosperms there is the greatest diversity in the amount of endosperm, dependent on the size of the embryo, which may completely fill the embryo-sac, in which case the seeds are often called *exalbuminous*, "albumen" being the old name applied to endosperm. In case the embryo but partially fills the embryo-sac, the endosperm is developed around it, and the seed is said to be *albuminous*. The largest embryo-sac known is that found in the cocoanut, the "meat" of the nut being the endosperm, in which the embryo is imbedded, and which does not fill up the great sac with firm tissue, the rest of the space being filled with "milk." See also BOTANY, Vol. IV, p. 155.

ENEMY, as used in international law, means a citizen or subject of a foreign state with which war exists. The term is also applied to the hostile foreign state itself, and sometimes to a war-vessel of such state. A contract made with an enemy cannot be enforced, except when a state gives its citizens permission to enter into such contracts. There are, perhaps, other exceptions to the rule, as in case a citizen is in the territory of the enemy and makes a contract for necessities, or for money with which to return home.

ENERGY, DISSIPATION OF. While it is true that the total amount of energy in the universe is constant, and that any form of energy may be transformed into any other, it can be shown that the changes take place in some cases with greater ease than in others; hence, in time, all energy will be changed into that form which is the most difficult to transform, namely, the energy of molecular motion or heat. The availability of heat to do mechanical work depends upon a difference of temperature, and as all bodies must eventually come to the same temperature, the amount of available energy in the universe is decreasing gradually. This loss of availability is usually spoken of as the dissipation or degradation of energy.

Many illustrations occur in nature. An electric current has some of its energy transformed into heat, on account of the resistance of the conductor, which heat is radiated to the surrounding objects, and very little of it finds its way back into the original form of energy.

A falling body, upon striking an object, has its kinetic energy transformed into heat. This heat might be used to lift other bodies, but with a perfect engine all of it would not be transformed.

ENERGY EXPENDED IN CHARGING A CONDUCTOR. See ELECTRICITY, § 29, in these Supplements.

ENFIELD, a town of Hartford County, northern central Connecticut, on the Connecticut River, and on the New York, New Haven and Hartford railroad, 10 miles S. of Springfield, Massachusetts. Here is situated the great Thompsonville carpet factory, which has over 300 looms, and a capacity of manufacturing nearly six million yards annually; also the Hazardville powder-mills, one of the largest in the world. Other manufactories are those of sewing-machines, plows, carriages, sashes and blinds, hats, brick and harness. Population 1896, nearly 10,000.

ENFIELD, a village of Grafton County, central eastern New Hampshire, 42 miles N.W. of Concord, on the Mascoma Lake, and on the Boston and Maine railroad. The place is a summer resort, and a portion of the inhabitants are members of the United Society of Shakers. They manufacture pails, tubs and brooms, and raise garden-seeds. There are also manufactories of furniture, leather, knit goods and carriages. Population 1890, 1,439.

ENFIELD, a village of Halifax County, northeastern North Carolina, 62 miles N.E. of Raleigh, on the Atlantic Coast Line railroad. It exports large quantities of cotton, lumber, staves, peaches, wine, shingles and brick. There is a gold-mine in the vicinity. Population 1890, 568.

ENFILADE FIRE AND DEFENSE. See FORTIFICATION, Vol. IX, p. 426.

ENGANO, a Dutch island of the Malay Archipelago, 75 miles W. of the southern end of Sumatra, lat. 5° 21′ S., long. 102° 20′ E. It is high and well wooded and has a good harbor, but is surrounded mostly by coral reefs. Area, 128 square miles; population, 6,400.

EN-GEDI (Heb., *Eyn Gedi*, "Fount of the Kid"), a town of Palestine, on the west shore of the Dead Sea, midway between its extremities. It stood, as its ruins show, in a very fertile spot, near a fine fountain of the same name, but its surroundings were a wilderness. Numerous caves are found here, and it was among these that David hid from Saul. It is mentioned in several places in the Bible (Ezek. xlvii, 10; 2 Chron. xx, 2; Gen. xiv, 7; Song of Solomon, i, 14; etc), sometimes under its original name of Hazezon-tamar.

ENGEL, ERNST, a German statistician; born in Dresden, March 26, 1821; was educated at the School of Mines in Freiburg; traveled extensively in Germany, France and Belgium; was appointed, in 1848, secretary, and, in 1849, president, of the German commission for the examination of industrial questions; and from 1850 to 1858 he was connected with the Bureau of Statistics, whose director he was appointed in 1860. From this time until his retirement in 1882 he was constantly employed in the publication of statistical works, the most important of which are *Country and Inhabitants of Prussia; Revision of the Industrial Statistics of Germany, of the Other States of Europe, and of North America;* and *The Age of Steam.* He also had in charge the publication of *Preussische Statistik* and *Zeitschrift des Statistischen Bureau.* Died at Lössnitz, Dec. 8, 1896.

ENGEL, JOSEPH, an Austrian zoölogist and anatomist; born Jan. 29, 1816, in Vienna, where he received his education. His early investigations in anatomy having won him considerable reputation among zoölogists, he was appointed, in 1844, to a professorship of descriptive anatomy in the University of Zurich. Five years later he became professor of pathological anatomy in Prague, and in 1854 professor of descriptive anatomy in Vienna. Important among his published works are *General Pathological Anatomy* and *Special Pathological Anatomy.* These works place him among the foremost authorities upon the subject of which they treat.

ENGELMANN, GEORGE, a German botanist; born in Frankfort-on-the-Main, Feb. 2, 1809. He studied medicine and the natural sciences in Heidelberg and Berlin, and, after a brief connection with the University of Berlin, came to the United States, settled in St. Louis, and soon became prominent as a physician. In 1836 Dr. Engelmann founded *Das Westland*, a German newspaper, which gained high reputation in the United States and in Europe for its vivid and accurate descriptions of American life. He did not, however, relinquish the botanical studies begun by him in Germany, and was a constant contributor to the *Proceedings of the American Academy*, and was employed by the government in the preparation of botanical reports upon various North American families. His work upon the pines, spurges and cacti, groups presenting exceptional difficulties, is of great value. His reports and monographs, numbering more than one hundred, have been collected and published, in a limited edition, as the *Botanical Works of George Engelmann.* He died in St. Louis, Feb. 4, 1884, and his valuable herbarium and library passed into the possession of the Missouri Botanical Gardens.

ENGINEERING SCHOOL. See TECHNICAL SCHOOLS, in these Supplements.

ENGINEERING SOCIETIES OF THE UNITED STATES, organizations formed for mutual benefit, and for learned investigation on topics of direct interest to the members. The following are among the most important of these societies:

American Institute of Mining Engineers, with headquarters in New York City, has a membership of 2,500. It has been established more than 25 years, and is the leading one of the American societies. The secretary maintains a permanent office at 13 Burling Slip, New York.

The American Society of Mechanical Engineers was incorporated Dec. 27, 1881, and had, in November, 1895, a total membership of 1,748, of whom 16 were honorary members, 101 associate members, 294 junior members, and 1,337 active members. Included in the above are 64 life members. The permanent home of the society is at 12 West Thirty-first Street, New York City, where a four-story building is owned and occupied. The initiation fee is $15 for juniors and $25 for members and associates, with annual dues of $10 and $15, respectively. Two annual meetings are held, in spring and autumn, for the reading and discussion of technical papers and for professional and social intercourse, the proceedings of which meetings are published in an annual volume, containing from 600 to 1,000 pages of valuable engineering literature.

The American Institute of Electrical Engineers maintains its executive offices, library and reading-rooms at 26 Cortland Street, New York City. Monthly meetings are held at 12 West Thirty-first Street, New York, and at 1737 Monadnock Building, Chicago, Illinois, and the proceedings are printed monthly. The membership is not limited, and in August, 1896, consisted of 1,050 members of all classes. The entrance fee is $5 and the yearly dues $10.

The American Society of Civil Engineers was instituted Nov. 5, 1852, and had a total membership, 1896, of 1,930. This includes 1,240 active members, 243 associate members and 279 juniors, in addition to whom there are honorary members, corresponding members, associates and fellows. The entrance fee for ordinary members is $30, with yearly assessments of $25. The other fees and dues are fixed by a scale, according to the class of membership. The fellowship fee is $250, in one payment, and is for life. The annual meeting is held on the third Wednesday of January. A yearly convention is held at the time and place fixed by the society. Publication is made of all the transactions of the society. The permanent home of the association is at 127 East Twenty-third Street, New York City.

The Western Society of Engineers was organized in 1869, and incorporated in 1880. The total membership is 414, in classes as follows: One honorary member, 382 active members, 26 associate members and 5 junior members. The entrance fee is $10. Regular meetings are held monthly, the proceedings of which are published. A bimonthly journal is also published. The office of the society is at 1736 to 1739 Monadnock Block, Chicago, Illinois.

There are a number of engineering societies in addition to those named, with memberships ranging from 50 to 250. They are instrumental in influencing legislation in matters pertaining to engineering interests, and their members are selected for service on legal boards, where their knowledge and skill avail in matters of water-supply, sewage disposal and construction.

ENGINEERS, Corps of. See Army, Vol. II, pp. 579, 603, 606, 610, 619.

ENGLAND. See England, Vol. VIII, pp. 215–381; and Great Britain, in these Supplements.

ENGLAND, John, bishop of the Roman Catholic Church; born Sept. 23, 1786, in Cork, Ireland. In preparation for an ecclesiastical career, he was for five years at the Carlow Divinity School, where his philanthropy and eloquence won him considerable prominence. He was ordained at the age of 22 and began to preach in North Chapel, Cork. In 1809 he founded the *Religious Repertory*, a journal whose vigorous attack upon the governmental plan to exchange Catholic emancipation for church concessions brought its free-thinking young editor into court and subjected him to a fine of five hundred pounds. In Cork Cathedral, 1820, John England was consecrated the first bishop of Charleston, South Carolina. He was thus put at the head of nearly ten thousand Catholics, and his diocese covered the Carolinas and Georgia. He established the *United States Catholic Miscellany*, the first Catholic journal published in America. Bishop England was a prelate of remarkable devotion to his people. His constant exposure of himself in administering to the wants of the sufferers during a severe epidemic of yellow fever was typical of the many acts of heroic charity which won him the love and respect of the community, over which he exerted a wide influence. He died in Charleston, April 11, 1842.

ENGLEWOOD, a village in Bergen County, northeastern New Jersey, on the New York, Lake Erie and Western railroad, 14 miles N. of New York City, and near the palisades of the Hudson River. It is a residence suburb of New York. Population 1890, 2,400.

ENGLISH, George Bethune, an American lawyer, theologian, author and adventurer; born March 7, 1787, at Cambridge, Massachusetts. He graduated in 1807 from Harvard, where his remarkable facility in acquiring languages made him conspicuous. His attention, the next ten years of his life, was divided successively between law and theology; then, having abandoned these pursuits, as well as journalism, in which he had made desultory attempts, he entered the army of Egypt, and under Ibrahim Pasha rendered valuable service in the war with the Abyssinians, and rose to be a general of artillery. He returned to the United States in 1827. In his *Grounds of Christianity Examined*, published in 1813, Mr. English argued for the truth of the Old and the falsity of the New Testament. He was answered by Edward Everett, and responded with *Five Stones Out of the Brook*. His *Narrative of the Expedition to Dongola and Sennaar* is an account of his Egyptian military experiences. He died in Washington, Sept. 20, 1828.

ENGLISH, James Edward, an American politician; born in New Haven, Connecticut, March 13, 1812; became prominent in business; sat in the state legislature from 1855 to 1858, and was elected to Congress in 1861. From 1867 to 1870 he was governor of Connecticut, and in 1875–76 served as United States Senator, filling out the term of Orris S. Ferry. He was afterward chairman of the National Democratic Committee. He died in the city of his birth, March 2, 1890.

ENGLISH, Thomas Dunn, an American lawyer, journalist and author; born in Philadelphia, Pennsylvania, June 29, 1819. He was educated at the University of Pennsylvania, graduating with the degree of M.D. in 1839. He entered the profession of law in Philadelphia in 1842, and was elected a member of the New Jersey state legislature in 1863 and 1864. In 1890 he was elected Representative from the sixth Congressional district of New Jersey, and was re-elected in 1892. Mr. English began in his youth to contribute verses and prose sketches to the press, and, while yet a young man, wrote *Ben Bolt*, a favorite ballad which had a second lease of life conferred on it when Du Maurier put its melodious words into the mouth of his heroine in *Trilby*. A series of his ballads recounting battles of the American Revolution were published in *Harper's Weekly*. He is also author of the novels *Ambrose Fecit; Walter Woolfe;* and *MDCCCXLIV*.

ENGLISH, William Hayden, an American capitalist and politician; born at Lexington, Indiana, Aug. 27, 1822. He graduated from Hanover College, Indiana; studied law; became an influential Democrat, and held governmental positions under Presidents Tyler and Polk. In 1852 he was elected to Congress, and was re-elected in 1856 and 1858. During the war he accumulated a large fortune in the banking business. In 1880 he was the Democratic candidate for the Vice-Presidency, on the ticket with Gen. W. S. Hancock, and suffered defeat with him. He died in Indianapolis, Indiana, Feb. 7, 1896.

ENGLISH CHANNEL, a large body of water which separates England from France, and connects the North Sea with the Atlantic Ocean. It is about 100 miles wide at its western end, and its eastern end forms the Strait of Dover (Fr., *Pas de Calais*), which is 21 miles wide. There is a strong current, which passes through the channel, running eastward. The water is often very rough and tumultuous.

ENGLISH HARBOR, a port on the south side of the British island of Antigua, in the West Indies, lat. 17° 3′ N., long. 61° 45′ W. It is considered one of the finest in the islands, being sheltered on

all sides, and very spacious. It has a dockyard and a naval hospital.

ENGLISH PALE or THE PALE. See IRELAND, Vol. XIII, p. 262.

ENGLISH RIVER, a South African estuary. See DELAGOA BAY, Vol. VII, p. 40.

*ENGRAVING. A review of engraving as practiced at the end of the nineteenth century must necessarily deal largely, if not wholly, with the photomechanical processes. Progress in the art of illustration has superseded many of the processes described in ENGRAVING, Vol. VIII, pp. 435–446, for commercial use, though it cannot impair their art value.

The history of photomechanical processes dates back to the year 1813, when Niepce began experimenting with resinous substances, and produced, after a time, engraved plates from his method. But not until the year 1839, when Ponton successfully applied potassium bichromate to "process," was the foundation laid for modern methods of photomechanical reproduction. In the year 1852, in both France and England, processes involving the use of asphaltum and bichromatized gelatine as "resists" for both relief and intaglio engraving were successfully worked, though in a small way. All of these processes were designed to produce "half-tone" on stone, but were short-lived, as they proved to be commercially impracticable. Since 1870 the amount of activity and research looking toward the invention of a commercially practical "process" has been marvelous, the more important improvements being due to the invention of "half-tone" screens or "tints," for which Frederick E. Ives, an American (1881), and the Meisenbach Company (1882) stand credited. The demand for engraved blocks that would give in reproduction artistic and faithful results led to the evolution of the modern "process." True it is that the processes have their limitations, but they are relatively unimportant, especially when "process" blocks receive the supplementary attention now much in vogue.

The use of the modern photo-mechanical "process" is for the reproduction of wash-drawings, paintings, pen-and-ink drawings, and occasionally scenes from nature directly, for general illustrative purposes.

The photo-engraving processes to which this review is limited owe their birth to the demand for a process which, from any scene in nature, or stationary or moving object, or work of art of any kind, will produce a block or engraved plate printable in ordinary printer's ink on a printing-press, and at the same time reliable in the rendering of detail, of the general effect of light and shade, and of the relative value of all colors or gradations of color involved. This may be termed the ideal of "process."

The modern processes greatly depend on the skill and judgment of the artisan. This is due, in part, to photography itself, which produces negatives of varying degrees of perfection, consequently requiring correction, but more largely to the succeeding operations at the hands of the various artisans in the workshop. Doubtless an early day will show a satisfactory development of engraving by scientific methods. It may be stated that already the reproductions from nature and works of art by modern processes are marvelously faithful as to detail.

The photomechanical processes in successful operation are based upon the properties of three resinous and glutinous substances, and the changes which they experience when subjected to light. These substances are asphaltum, albumen and gelatine.

If asphaltum, properly prepared by washing in ether, dissolved in benzole, and stained black to make it easily visible on the plate, is thinly spread on a plate and exposed to light for a time, it becomes impervious to its usual solvents, such as turpentine and benzine. If, therefore, such a plate as is usually employed in process-work is so coated and then dried in the dark room, and finally exposed under a printing-screen, the parts of the coating under the clear portion of the screen will become impervious to the solvent employed, since they will have been subjected to light, while those parts under the dense portions of the screen, having been protected from the light, will remain soluble. If the plate be then treated with a solvent, those parts of the asphaltum remaining soluble will be removed, while the impervious parts will remain. It can now be easily understood that if the plate be etched, a printing block or engraving will result. If the plate be exposed under a negative, a relief-block will be the result; if under a positive, so that the whites have been hardened, an intaglio plate will be obtained.

Albumen may be treated in much the same way as asphaltum, if mixed with a solution of potassium bichromate, the chief difference being in certain modifications of manipulation. The solvent of albumen is cold water.

The uses of gelatine are more complex. Gelatine, which is glue in a purified form, swells in cold and dissolves in hot water. Upon cooling it assumes the consistency of jelly, and finally dries out and hardens again. There are various gelatines, some hard, some soft, which differ in properties, and the kind of gelatine used must be adapted to the work. If gelatine is mixed with potassium bichromate, it retains its original qualities while wet, and also after drying, if kept in the dark. On exposure to light, however, it will no longer swell in cold or dissolve in hot water. From this change in the nature of the gelatine, various other results follow. For instance, in its normal state, if made to adhere to an unyielding surface and then swell, gelatine assumes a reticulated grain, but it loses the faculty of reticulating in exact proportion to the degree of exposure to light to which it may be subjected. Again, unchanged gelatine has no power of resistance to etching-mordants, but bichromatized and exposed to lights, it acquires this power. Finally, it becomes capable of resisting the impact of sharp bodies, like grains of sand in the sand-blast, the degree of resistance again corresponding to the degree of exposure to the light. All these peculiarities are made use of in modern "process." The chemical process involved in the action of light on the three substances mentioned above, when mixed with a chromate, is one of oxidation, the asphaltum appropriating oxygen from the air, the glutinous

*Copyright, 1897, by The Werner Company.

substances being affected by the oxygen liberated by the reduction of chromic acid to chromic oxide, which takes place when a chromate is exposed to light in the presence of organic substances. Potassium bichromate is commonly used, but any other chromate, the base of which will not precipitate gelatine, will serve.

To produce a "half-tone" block, the tints of the "original" must be converted into corresponding masses of lines or dots in the negative. To accomplish this, a screen is interposed between the "original" and a sensitive plate in photographing. The screen used may be grained or lined. The processes now chiefly used involve the use of a screen or "tint" made of two plates of glass, a set of fine black lines being ruled diagonally across each, and the two being so cemented together that the lines cross at right angles. This style of screen was first used in the "Ives process" about 1881, and has since been generally adopted in America. About the time Mr. Ives put out his screen the Meisenbach screen was also invented. This screen has diagonal lines ruled in parallel, in but one direction, on the glass plate. There are no cross-lines whatever, and the practice is, after a short exposure, to turn the screen in the camera, so that the lines run in a directly opposite direction, after which a second exposure is made.

Following photographing, in "process," comes the etching used for the production of blocks. In this, the problem is to etch the closer as well as the more open work to a depth which will prevent the ink from filling up the spaces between the lines in the process of printing, and at the same time to leave each line with a foot increasing in thickness downward, so that the line will not break under reasonable pressure when on the printing-press. The present method of etching is practically the same as that invented by Gillot of Paris in 1850. It requires great care and skill, and upon the etcher, more than any other artisan employed in the production of a process-block, depends the success of the block in printing. Good or poor "printing quality" has made or marred the reputation of many a process house. In the etching process, the sides as well as the surface of each line must be carefully protected—the sides in progression as the etching deepens. To insure this protection, the plates are powdered, from time to time, with "dragon's blood"—a resinous vegetable product of the West Indies and South America—which is melted on, thus gradually coating the sides downward and filling up the finer parts of the plate as completed.

The "Half-tone" Process chiefly in vogue is a screen process for the production of relief-blocks, the photo-aquatint and mezzotint methods of producing "half-tone" for commercial use having been almost entirely superseded. In the "half-tone" screen process, the first and most important step is the making of a black and white negative, in which the tints or gradations of color of the "original" are converted into masses of black dots in the negative, preserving in the negative the gradations of color of the "original" which is to be reproduced. To produce this negative, a wet collodion or gelatine dry plate is placed in the camera, and before it, at a slight distance, is placed the screen or "tint" to be used. The light reflected from the "original" then passes through the clear spaces of the screen to the sensitive plate, the black lines of this screen, of course, shutting off such rays as are reflected against them. Thus the effect on the sensitive plate is an image of the "original," consisting of isolated dots, the size and density of which determine the color in the negative. The negative once produced, it is the privilege of the operator to use the etching, the swell gelatine or the wash-out process for the production of the block. The etching process is so generally used that a description of the other two is needless. In the etching process the negative is reversed and printed upon the metal plate to be etched. After etching, a rough or "flat" proof of the plate is taken, and passed with the plate to an engraver, who inspects the plate with a glass, for portions needing retouching. All needed corrections having been made, the plate is passed along for artist's proofs, thence to the routing and blocking rooms to be prepared and mounted "type-high" for the printer.

The size of the negative, hence that of the plate, is determined by the distance of the "original" from the lens in the camera during photographing; the greater the distance, the smaller the negative. Negatives may be successfully made any size, from the size of the "original" downward. It is well to plan for reduction in size, however, and most drawings are made with a view to reduction of one fourth to one third in the reproduction.

The metals used in the process are copper and zinc, as a rule, although occasionally other metals are seen. In America, copper is chiefly used, as its texture and degree of hardness are found to be more even than in zinc. Copper also lends itself to the supplementary treatment of the hand-engraver, now so much in vogue, far better than zinc, and does not corrode in the block, like zinc. Zinc is chiefly used when economy of production is desired.

In the "half-tone" process, as indeed in "process" generally, the use of the electric-lamp is superseding sunlight photography. In these days of large plants and keen competition, a house must always be sure of its "sun"; and the modern high-power, steady-burning and economical electric lamp supplies the need.

The screen or "tint" used in "half-tone" varies in the number of cross-lines to the square inch, according to the use to which the engraved plate is finally to be put. The screens most used vary in size from 133 to 150 lines to the square inch. These sizes are adopted as best suited for printing upon the clay-coated or machine-finished papers ordinarily used for book-work. For printing upon news- or low-finished paper, with cheap ink, a screen smaller than 133 lines must be used for success in printing. When a "half-tone" block is to receive supplementary or wood-engraving treatment, a fine screen should be used. Experience has shown 175 lines to be about the proper size, as rows of dots may then be taken out of the plate by the hand-engraver, without fear of producing patches of solid white, so fatal to artistic effect.

Supplementary Treatment of "Half-tone" Plates. The last-described process produces a straight commercial "half-tone," easily identified, as a rule, by its rectangular outline and general screen effect throughout its area. A recent demand upon the process engraver is for a "half-tone" which is stronger in light and shade and artistic effect than that which the regular screen process can produce. This has given rise to supplementary treatment, or retouching, which is of growing importance. Retouching came into practice from the fact that a negative, even after skillful manipulation, is frequently unsuccessful, necessitating manual treatment of the plate after etching, in order to secure desired results. Then, too, the interposition of the lined screen used in making a "half-tone" lowers the key of a picture, and, although producing a soft effect, has a tendency toward flatness and lack of contrast. At first the roulette-wheel was used to lighten tints, but was shortly abandoned, because of injury to the plate, and the practice of re-etching to obtain delicacy in the lights came into vogue. If a tint comes too dark, it is subjected to further biting, the rest of the plate being stopped out. This makes the dots sharper, and gives relief. A very light tone can be obtained when required, by taking out every other line of dots by hand. The easiest direction to follow is that made by the lines of the screen, which cross the plate diagonally, although there is a secondary series crossing the plate horizontally. Although the lights are apt to suffer most in "half-tone" productions, much of the flatness is due to loss of color in the shadows. This defect can be somewhat overcome by burnishing the surface. In these ways it will be seen that much can be done to increase the brilliancy and contrast of a "half-tone" plate. The better class of work demanded by the best magazines involves greater freedom in handling the plate than has here been outlined. The method is practically the same as that of the modern wood-engraver in producing his block for the printer.

The Line-Relief Process varies from the "half-tone" process immaterially. This process is chiefly used for reproducing pen-and-ink drawings and relief-prints. No screen is used in the camera when photographing, and there is, obviously, rarely any need of supplementary treatment after the process of etching. Zinc is the metal chiefly employed for economical reasons, as it answers every purpose. Copper is sometimes used, however, to gain especial effects. Many houses in this process coat the zinc plates with a deep copper-colored enamel, the formula for which probably varies with each establishment, and is supposed to be secret. The purpose of the enamel is to preserve integrity of line and to insure a better printed result. It may fortify the zinc, but it rarely lasts beyond a good "run" on a printing-press. The line-relief process is the most scientific and satisfactory reproductive process of our time, for by it, with proper attention to details, perfect reproductions of almost any original may be made. This process is used for the illustration of the larger newspapers, by reason of its general accuracy and quickness, as well as the cheapness with which a finished plate may be produced.

Intaglio-Engraving. To produce a photogravure from an "original" in pure black lines to be printed on a hand-press, a metal plate coated with asphaltum or bichromatized albumen is exposed under a black and white positive. Treating the plate after exposure with a solvent leaves the metal bare under the lines of the positive, and the plate is then ready for etching, the hardened coating under the lights of the positive acting as a "resist" to the mordant. This process is used to a limited extent only.

Photo-aquatints or half-tone intaglio plates from paintings and photographs are made as follows: A dry aquatint ground is laid on a metal plate, following which a gelatine negative film is mounted over the aquatint ground. To obtain the negative, a reversed positive on glass must first be made. The film must be made by what is known as the pigment-printing process, and is a wash-out relief, thickest in those parts which are to show white in an impression from the plate, and thinning out toward the dark areas. The film, in etching, acts as a "resist" to the perchloride of iron, almost invariably used as a mordant, as a "still mordant" is very necessary in the process, that the film may not be torn up. In etching, successive baths with the mordant are used to get desired results. After etching, the plate is usually treated by hand, the lights being burnished by a burnisher and the darks being strengthened where necessary. Another photo-aquatint process involves the use of a swell-gelatine relief film, instead of the hardened wash-out gelatine film of the first-described process. In this latter process, the aquatint ground is laid on the plate *over* the film, and three or more repetitions of the first treatment are given the plate, a coarser aquatint ground being used each time, and solutions of increasing strength as well, the whole process being a gradual development of the blacks in the result. From an artistic point of view, intaglio half-tone photogravure, is superior to the screen process.

Chalk-Plate Relief-Engraving is simplicity itself. A metal plate is first evenly covered with a "chalk" or china clay composition, to the depth of about one sixteenth of an inch. In this coating the drawing to be reproduced is made with tools down to the surface of the metal plate. The printing-plate is then furnished by the stereotype process. The rapidity of the process makes it well adapted to newspaper-work, where cuts required are not large. The United States government uses a chalk-plate process at some stations for the production of weather maps.

The Wax Process is utilized for making railroad, geographical, state, county and town maps, mechanical and architectural diagrams and fine script. By it are produced plates which cannot be surpassed in beauty, clearness of line and good printing quality. In this process, a polished copper plate is stained black by a chemical solution. It is coated with a thin composition of wax and resin rendered opaque by the addition of mineral coloring, and a photograph of the "copy" is made on the surface of the wax; the lines and shading forming the picture are then cut through the film of the wax to the surface

of the plate with steel tools. Letters or figures are usually set up in type and pressed into the wax. Open spaces are then filled with bees-wax to give the necessary relief, defects are corrected and the plate coated with plumbago and electrotyped.

ALBERT G. GLOVER.

ENGROSSING, a commercial term of English statute law. See *Engrossing* and *Forestalling*, under CORN LAWS, Vol. VI, p. 412. The term is also used by lawyers, scriveners and law-stationers in England to denote the fair copying of a deed upon parchment or stout paper ready for signature.

ENGSTLEN ALP, a tourists' resort in Unterwalden Canton, northern central Switzerland, just south of Engelberg. It has an altitude of 6,092 feet, and is situated very beautifully, being surrounded by lofty snow-capped mountains, fair pastures, and having in the vicinity the Engstlensee and the Wunderbrunnen, an intermittent spring, and the falls of the Engstlenbach, all of which make it a very attractive place to visitors.

ENHARMONIC, in music, intervals less than a semitone. See MUSIC, Vol. XVII, pp. 79, 91.

ENNA, a noted ancient city. See CASTRO, GIOVANNI, Vol. V, p. 201.

ENNEKING, JOHN J., an American artist; born in Minster, Ohio, in 1841. He attended St. Mary's College, Cincinnati, where he studied drawing under Bishop Rosencranz. He entered the army in 1861, but was wounded severely, and was mustered out after a year's service. In 1865, having recovered, he went to Boston, engaged in mercantile life, and then turned his attention to art, studying in pastel at first. He went to Europe for study in 1872, and worked in Paris two years under Bonnat, devoting himself to the figure mainly. Daubigny advised him to study landscape, however, which he did. He returned home in 1874, and has devoted himself since to autumnal and sunset subjects, many of his pictures being full of brilliancy and subtle atmospheric effects. Among his important pictures may be mentioned *Moonlight on the Gindecca, Venice; Drove of Cattle on a November Day;* and *The Obersee.*

ENNEMOSER, JOSEPH, a medico-philosophic writer, born at Hintersee, in the Tyrol, Nov. 15, 1787. He commenced his academic studies at Innsbruck in 1806. On the rising of the Tyrolese against the French in 1809, Ennemoser honorably distinguished himself in battle on several occasions. In 1816 he took the degree of doctor of medicine, and in 1819–37 was professor of medicine at the new University of Bonn, and then practiced at Innsbruck. In 1841 he went to Munich, where he obtained a great reputation by the application of mesmerism as a curative power. He wrote a number of books, of which the *History of Animal Magnetism* is most widely known. He died at Egern, Bavaria, Sept. 19, 1854.

ENNERDALE LAKE, an expansion of the river Eken, in the southern part of the county of Cumberland, northern England, 7 miles N.E. of Egremont. It is 2½ miles long and less than a mile wide, situated in a pretty region at the foot of the Cumbrian Mountains.

ENNIS, a city of Ellis County, northeastern central Texas; 35 miles S.S.W. of Dallas, on the Houston and Texas Central railroad. Its business is cotton-compressing, manufacturing and trading. Population 1890, 2,171.

ENNS, a river of western Austria, rising in the Noric Alps, eastern Salzburg, and flowing eastward into Styria as far as Hieflau, where it turns, north and, traversing Upper Austria, enters the Danube eight miles below Linz. Its valley is fertile and beautiful. Length, 200 miles. It is only navigable from Steyer to its mouth, about twenty miles. At its junction with the Danube lies the town of Enns, which was, in 1809, the headquarters of Napoleon. It has active manufactories of iron, steel and cotton. Population 1890, 4,674.

ENSILAGE. See SILO, Vol. XXII, p. 67.

ENTABLATURE. See ARCHITECTURE, Vol. II, p. 464.

ENTADA, a genus of tropical leguminous climbing shrubs (suborder *Mimoseæ*) having pinnate or bipinnate leaves, and being remarkable for their great pods, in which the egg-sized seeds lie amid a gelatinous substance. These pods are sometimes fully five feet long and six inches broad.

ENTELLUS MONKEY OR HANUMAN (*Semnopithecus entellus*), a monkey found in great numbers in India, especially near the temples. The Hindoos believe them to be the embodiment of the souls of deceased ancestors, and carefully protect them. They often commit great depredations in the fields and gardens. See APE, Vol. II, p. 151.

ENTERITIS, inflammation of the small intestines, and especially of their muscular and serous coats, leading to constipation and pain, with colic, and sometimes intestinal obstruction. Enteritis is distinguished from these last affections indeed only by the presence of inflammatory symptoms—that is, pain, tenderness, fever, etc.—from a very early stage of the disease, and in so decided a form as to require special attention. The disease is one of great danger, and should never be incautiously treated with domestic remedies. It is closely allied to peritonitis, and often depends upon internal mechanical causes, or on external injury. See SURGERY, AMERICAN, in these Supplements.

ENTEROPNEUSTA, a group of worm-like animals composed of Balanoglossus and its allies. See BALANOGLOSSUS, in these Supplements.

ENTERPRISE, a winter resort and the capital of Volusia County, central eastern Florida, situated at the head of steamboat navigation on St. Johns River, 80 miles S. of St. Augustine, and on the Jacksonville, Tampa and Key West railroad. Green Spring, a noted sulphur-spring, 80 feet in diameter and 100 feet deep, is located here. Permanent population in 1896, about 200.

ENTERPRISE, a city of Dickinson County, eastern central Kansas, very favorably situated on the Smoky Hill River, and on the Atchison, Topeka and Santa Fé and Chicago, Rock Island and Pacific railroads, 77 miles W. of Topeka, in a

fertile prairie country. Grain of various kinds are raised in the vicinity, and the city has flouring-mills, a machine-shop and a foundry. Population 1895, 935.

ENTHYMEME, a term in rhetoric. See RHETORIC, Vol. XX, pp. 511, 512.

ENTOMOLOGY, the systematic study of insect-life. See INSECTS, Vol. XIII, pp. 141–154.

ENTOMOPHAGA, a group of insect parasites. See INSECTS, Vol. XIII, p. 148. Also a family of insect-eaters. See MAMMALIA, Vol. XV, p. 384.

ENTOMOSTRACA, same as Gnathopoda. See CRUSTACEA, Vol. VI, pp. 662 et seq.

ENTOPHYTES. See *Vegetable Parasitism*, under PARASITISM, Vol. XVIII, p. 264.

ENTRE RIOS, a province of the Argentine Republic, South America, which takes its name from its occupying the space between the Paraná and the Uruguay rivers, immediately above the point where they unite to form the Rio de la Plata. The area is estimated at 45,000 square miles. In 1890 there were 4,100,000 head of cattle, 4,900,000 sheep and 720,000 horses in the province. The chief industry is raising cattle, horses and sheep. There are also numerous meat-drying and packing establishments and many tanneries. Population, about 350,000. The capital is Paraná. Pop., 18,000.

ENTRY, the act of going in or upon property. Entry upon real estate is the act of going upon the lands of another, or lands claimed by the party entering, ostensibly for the purpose of taking possession. A party has the right of entry upon land when he has the right to possession, and may enter, provided he can do so peaceably, without the aid of legal proceedings, and after possession is thus obtained may retain possession and set up his title thereto. See FORCIBLE ENTRY AND DETAINER, in these Supplements.

ENUCLEATOR, an instrument for removing internal tumors, consisting of a circular blade, with the cutting edge on the inner side, and attached to a form of thimble, which may be placed on the tip of the surgeon's finger. The name is also applied to an instrument for grasping and extracting the eyeball in the operation of extirpation.

C. H. COCHRANE.

EOCENE AGE. See GEOLOGY, Vol. X, pp. 360–362.

EOHIPPUS, a genus of small extinct quadrupeds, found in the Eocene formations of the western United States. Its members were about as large as rabbits, and possessed four toes in front and three behind. It is regarded as having a place in the direct ancestral line of the horse. See HORSE, Vol. XII, p. 173.

EOPHONE, a device which enables one to hear sounds from a greater distance than with the ear alone, and to perceive, rapidly and precisely, the location of their source. A funnel, varying in size with the power of the instrument, is directed toward any point in the arc of probable sound, and by it the sound-waves are caught and reflected back into two rubber tubes, which terminate in ear-pieces. The sound becomes stronger as the funnel is directed more nearly in the direction of the sounding object, whose location may be accurately determined by this means. The eophone has been found to be of much value on shipboard, for, by its aid, ships running in a fog are enabled to promptly detect, at considerable distance, the approach of any sounding object. The instrument is usually arranged on vessels so that the sound-catching and dividing part extends above the top of the charthouse, while the tubes are brought within and the receiver turned in any desired direction by the operator in the charthouse. The inventor of the eophone, who spent several years in its perfection, was Frank de la Torre, of Baltimore, Maryland. For description of a similar instrument for examining the thorax, see STETHOSCOPE, Vol. III, p. 100.

EOSINE, a tetrabromated potassium salt; one of the phthalic acid colors. It is a reddish coloring matter, and is usually obtained from coal-tar. It is also called methyl-eosin and ethyl-eosin; has value as a fabric dye, but is more important as a nuclear stain in both plant and animal histology. Its symbol is $C^{20}H^{8}Br^{4}O^{5}$. See also DYEING, Vol. VII, p. 575.

EOZOÖN. See GEOLOGY, Vol. X, p. 328.

EPACRIDACEÆ, a family of exogenous plants, consisting of shrubs and small trees, which, both in appearance and in botanical character, much resemble the *Ericaceæ*, or heath family. The most important distinguishing structural character is found in the simplicity of the anthers, which are one-celled, open longitudinally, and are destitute of appendages. The flowers of the *Epacridaceæ* have generally a tubular corolla, dividing into five segments, which sometimes become separate petals. The calyx is persistent, often colored, has the same number of segments with the corolla, and is surrounded with small bracts. The stamens are fewer than in the *Ericaceæ*, usually equal in number to the segments of the corolla, and alternate with them. The fruit is sometimes a capsule, sometimes a berry, sometimes a drupe. The leaves are simple, generally alternate, often crowded; the flowers in spikes, terminal racemes, or axillary and solitary. About 400 species of the *Epacridaceæ* are known, all natives of the Indian Archipelago, the South Sea Islands and Australia.

EPACT. See CALENDAR, Vol. IV, pp. 672, 673.

EPAULEMENT. See FORTIFICATION, Vol. IX, pp. 424, 425.

EPEIRA, a genus of spiders, the type of a family, *Epeiridæ*. This family contains some of the most brightly colored arachnids. Their circular webs consist of radiating threads, united by a spirally arranged cross-thread. Members of the genus are common in the United States.

EPHEMERIS, astronomical tables giving the daily places of the sun, moon and planets, and other phenomena of the heavens. See NAVIGATION, Vol. XVII, pp. 261, 262.

EPHOD, a vestment worn by the Jewish priests. It consisted of two shoulder-pieces, one

covering the back, the other the breast and upper part of the body. Two onyx stones set in gold fastened it on the shoulders, and on each of the stones were engraved the names of six tribes, according to their order. A girdle or band, of one piece with the ephod, fastened it around the body. Just above this girdle, in the middle of the ephod, and joined to it by little gold chains, rings and strings, the high-priest wore the square oracular breastplate with the mysterious *Urim* and *Thummim*.

EPIC POETRY. See POETRY, Vol. XIX, pp. 266–269.

EPICYCLOID, the name of a peculiar curve. When a circle rolls upon a straight line, any point in its circumference describes a cycloid; but if the circle moves on the convex circumference of another circle, every point in the plane of the first circle describes an epicycloid, and if on the concave circumference, a hypocycloid. The circle that moves is the generating circle; the other the base. The principle of the epicycloid is utilized in the arts in the construction of toothed wheels. A small toothed wheel that travels about the inner circumference of a larger toothed wheel is an epicycloid wheel. The epicycloid curve applied to the teeth of wheels reduces friction to a minimum.

EPIDENDRUM, a genus of tropical epiphytic orchids, many species of which are cultivated in conservatories. *E. conopseum* is native in the southern United States, clinging by its matted roots to the branches of magnolias and other trees, its tuberous rootstocks bearing thick lanceolate leaves and a raceme of small greenish and purplish flowers. Several other species are restricted to Florida.

EPIDOTE. See MINERALOGY, Vol. XVI, p. 409.

EPIGÆA, a genus of plants of the family *Ericaceæ*, or "heaths," widely known in the United States as "trailing arbutus." There is a single species in Asia, and *E. repens* in the United States, the latter usually growing in pine woods, on sandy or rocky soil, being a prostrate plant, with reddish, bristly shoots, heart-shaped leaves, and a small cluster of rose-colored or whitish fragrant flowers in early spring. Other popular names are "ground-laurel" and "Mayflower."

EPIGLOTTIS. See VOICE, Vol. XXIV, pp. 273, 274.

EPIGYNOUS, a term applied to those flowers in which the sepals, petals and stamens seem to arise from the summit of the ovary. In such cases the ovary is often said to be "inferior." As examples, *Umbelliferæ*, *Compositæ*, *Iridiaceæ*, etc., may be cited.

EPILOBIUM, a genus of plants of the family *Onagraceæ*, having four sepals, four petals, a much elongated, four-sided, four-celled, four-valved, many-seeded capsule, and seeds tufted with hairs at one end. The species are herbaceous perennials, natives of temperate and cold countries, and very widely diffused both in the northern and southern hemispheres. The best-known species of the United States is *E. angustifolium*, the "great willow-herb," or "fireweed," being one of the plants that spring up abundantly, in the north, in burned-over forest clearings. It is five to ten feet high, with simple stems, an abundance of lanceolate leaves, and a showy raceme of pink-purple flowers.

EPIMACHIDÆ. See BIRDS OF PARADISE, Vol. III, pp. 778, 779.

EPIPHANIA, same as HAMAH; q.v., Vol. XI, pp. 401, 402.

EPIPHEGUS, genus of the family *Orobanchaceæ*, or "broom-rapes." The whole family is composed of root-parasites, *Epiphegus* occurring chiefly on beech roots, as the name implies. It has yellowish or brownish scales in place of leaves, is slender and bushy-branching, and bears purplish gamopetalous flowers in loose spikes or racemes. The common names are "beech-drops" and "cancer-root."

EPIPHYTES, a name applied in general to air-plants; that is, those which have no connection with the soil, and absorb all their food-supply from the air. Many Orchids and Bromelias are notable illustrations.

EPISCOPAL CHURCH, PROTESTANT. See PROTESTANT EPISCOPAL CHURCH, in these Supplements.

EPISTOLÆ OBSCURORUM VIRORUM. See REFORMATION, Vol. XX, p. 325.

EPITHELIOMA. See PATHOLOGY, Vol. XVIII, p. 382.

EPITHELIUM. See ANATOMY, Vol. I, pp. 847–849.

EPIZOÖTY, a general term applied to epidemic diseases among animals lower than man. See also MURRAIN, Vol. XVII, pp. 57–62.

EPODE, the last part of the chorus of the ancient Greeks, which they sang after the strophe and antistrophe, when the singers had returned to their original place; also, a variety of lyric poetry, in which a longer verse is followed by a shorter one. See HORACE, Vol. XII, pp. 159–166.

EPPING, a town in the county of Essex, southeastern England, 15 miles by rail N.E. of London. It is very irregularly built, and is noted for its creamery products and sausages, most of which go to London. It is at the north end of the Epping Forest, formerly Waltham Forest, which at one time covered all Essex, and extended almost to London, but is now limited to 60,000 acres in the southwestern part of the county. Of this, 12,000 acres is waste and woods, the rest being inclosed as private property, with the exception of 5,600 acres, which were obtained by the corporation of London for over $2,000,000, and in May, 1882, thrown open to the public by a declaration of the Queen. This tract now forms one of the most extensive and beautiful pleasure-grounds in Europe. The population of Epping town is nearly 3,000.

EPROUVETTE, a machine for testing the strength of gunpowder. Several varieties of eprouvette are in use. The one most common is shaped like a small pistol without a barrel, and has its breech-chamber closed by a flat plate, connected with a strong spring. On the explosion of

the powder against the plate, the latter is driven back an indexed distance, which is proportionate to the strength of the powder. The plate is retained at its extreme state of propulsion by a ratchet-wheel.

EPWORTH, a town in the northwest of Lincolnshire, eastern England, 30 miles N.N.W. of Lincoln, distinguished as the birthplace of John Wesley, the founder of Methodism, as also of Kilham, founder of the Methodist New Connection. Population, about 2,300.

EPWORTH LEAGUE, a young people's society connected with the Methodist Episcopal Church. The Epworth League originated in a conference of all the general young people's societies of the Methodist Episcopal Church, assembled in Cleveland, Ohio, May 14 and 15, 1889. Accredited delegates were present from the Young People's Methodist Alliance, the Oxford League, the Young People's Christian League, the Young People's Methodist Union, and the Young People's Methodist Alliance of the North Ohio Conference. The result of this meeting was the merging of these societies into one new organization, to be called the Epworth League, with the stated object "to promote an earnest, intelligent, practical and loyal spiritual life in the young people of the church; to aid them in constant growth in grace and in the attainment of purity of heart." The essential features of the organization are the weekly prayer-meeting, and the "intellectual" and "mercy and help" departments. The growth of the organization has been remarkable. In 1896 there were 19,500 enrolled chapters, and more than 1,250,000 members. The general organization includes district, annual conference, and general conference district leagues. The management rests with a board of control, five of whom are chosen by the bishops, five by the managers of the Tract Society, five by the managers of the Sunday School Union, and two are elected by each general conference district. The president must be a member of the Methodist Episcopal Church, and the remaining officers are to be of good moral character, but all must be approved by the quarterly conference. A pledge is provided, but its adoption by local chapters is made altogether voluntary. At the Methodist General Conference in Omaha, May, 1892, the Epworth League was adopted and indorsed officially by the church. The *Epworth Herald* is the official organ of the league. The general headquarters are at 150 Fifth Avenue, New York City. See METHODIST CHURCHES, in these Supplements.

EQUATOR, the great circle of the earth, whose plane is perpendicular to the axis of rotation. It divides the earth into the northern and southern hemispheres. See ASTRONOMY, Vol. II, p. 764.

EQUESTRIAN ORDER. See EQUITES, Vol. VIII, pp. 509, 510.

EQUESTRIANISM. See HORSEMANSHIP, Vol. XII, pp. 195–199.

EQUIDÆ. See MAMMALIA, Vol. XV, p. 429.

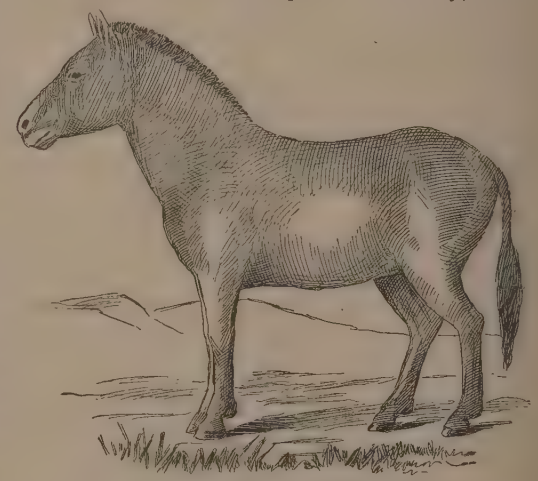
EQUILIBRIUM, of fluids, See HYDROMECHANICS, Vol. XII, pp. 440–444; of particles, see MECHANICS, Vol. XV, pp. 721, 722; of rigid solid, see MECHANICS, Vol. XV, p. 728; electrical, see ELECTRICITY, Vol. VIII, pp. 24–36.

EQUIPOTENTIAL SURFACES. See ELECTRICITY, § 26, in these Supplements.

EQUISETACEÆ, the only existing family of plants of the group *Equisetineæ*, a group largely represented in a fossil state by much more highly organized and more gigantic forms than exist now. The Equisetums of to-day are represented by a single genus, *Equisetum*, containing about twenty species, known as "horse-tails" or "scouring rushes." They are recognized by their jointed and fluted stems, leaves reduced to a whorl of brownish or blackish coalescent bracts, usually whorls of branches, and a terminal cone of sporangia. An abundant deposit of silica in the epidermis is one of the characteristics of the group, and has given to the species the use and name of "scouring rushes." Among ancient giant forms were the *Calamites* of the Carboniferous. See also HORSETAIL, Vol. XII, pp. 207, 208.

EQUITY OF REDEMPTION. See MORTGAGE, Vol. XVI, pp. 848, 849.

EQUUS PREZEWALSKII, the name of a new species of horse first discovered by and named after the Russian traveler Prejevalsky, and inhabiting the Dzungarian desert, between the Altai and Tianshan Mountains. The animal was described by the Russian naturalist Poliakof, in the proceedings of the Russian Geographical Society for January, 1881. Poliakof distinguishes the animal from the tarpans of Tatary, main-



EQUUS PREZEWALSKII.

taining that it is a distinct species. It is described as being so intermediate between the equine and the asinine group of *Equidæ* that it breaks down the generic distinctions which some zoölogists have thought fit to establish between them. It has callosities on all the four limbs, as has the horse; but only the lower half of the tail is provided with long hairs, in which latter respect it resembles the ass. Its general color is dun, with a yellowish tinge on the back, becom-

ing lighter toward the flanks, and almost white under the belly. There is no dark dorsal stripe, or "list." The mane is dark brown, short and erect, or "hogged." There is no forelock. The hair is long and wavy on the head, cheeks and jaws. The skull and the hoofs are more equine than asinine. In general shape it takes after the horse. There seems to be no possibility of its being a hybrid between the ass and the horse. Sir W. H. Flower is unable to resist altogether the suspicion that it may be a mule; but W. B. Tegetmeier regards the latter supposition as unlikely, because so many specimens could not have been obtained. Hybrids very rarely occur in nature; but the capture of a female specimen in foal would settle this interesting point, equine mules being invariably barren.

ERCKMANN-CHATRIAN, the compound name of two French romancists whose stories of Alsatian peasant-life are known the whole world over. A literary partnership was formed in 1848 between Erckmann and Chatrian, both natives of Lorraine. Émile Erckmann was born in Phalsbourg, Lorraine, May 20, 1822; studied law in Paris in 1842–48; returned to Phalsbourg in 1848, and for a time attempted to earn a living by literary work, but was soon obliged to return to the practice of law. He died in Lunéville, France, March 14, 1899. Louis Gratien Charles Alexandre Chatrian was born in Soldatenthal, Lorraine, Dec. 18, 1826; was educated at Phalsbourg College; spent a few years in his father's glass factory; returned to Phalsbourg College as an instructor; left the college to engage in literary work; but was forced to seek better paying employment in the railway service, where he remained until his death, in Villemomble, near Paris, Sept. 3, 1890.

The return of Chatrian to Phalsbourg found Erckmann there, and immediately the friendship which was to endure for over forty years began. Each desired to engage in literary pursuits, and together they published their first work in 1848, *Alsace en 1814*, a drama. A few months of precarious living convinced them both that they must each seek other employment, and so the one returned to his law and the other found a place with the Eastern railroad. But their literary partnership continued until the friends were famous, and the works of Erckmann-Chatrian were eagerly read in all Europe. *Alsace en 1814*, was played but once, being prohibited by the prefect of Phalsbourg. For a time they wrote stories and novels, which appeared in 1859 as *L'Illustre Docteur Mathéus*. After this they returned to dramas for a time, but it is for their descriptions of the pure Alsatian peasant-life that Erckmann-Chatrian will be long remembered. Their tales are realistic, but the realism embodies a patriotism which portrays the countryman in all his simplicity and honesty, not the realism which is flavored with degeneracy. Examples of this work are *Le Joueur de Clarinette* (1863), and *Madame Thérèse; ou les Volontaires de 92* (1863). In later life these tales gave place to historical romances, which, by their anti-German sentiment, caused general discussion. The work of writing is said to have been divided; with Erckmann doing the original work of blocking out the work and writing the first draft, and Chatrian doing the correcting and polishing. But it mattered little how the work was done, for such a unity of thought and expression was evident, that many thought it the labor of one mind. They thus worked together until 1889, when a quarrel arose over the division of the profits, and for a time the life-long friends were against each other. Before Chatrian's death they were reunited, but the survivor produced few works after the dispute. Among their works are *Contes Fantastiques* (1860); *L'Ami Fritz* (1864); *Histoire d'un Conscrit de 1813* (1864); *L'Invasion, Waterloo* (1866); *Le Juif Polonais* (1869); *Histoire d'un Paysan* (1868–70); *Histoire du Plébiscite Racontée par un des 7,500,000 Oui* (1872); *Contes Vosgiens* (1877); *Le Banni* (1882); *L'Art et les Grands Idéalistes* (1885); and *Pour les Enfants* (1888).

ERDMANN, Johann Eduard, a German philosopher; born at Wolmar, in Livonia, Russia, June 13, 1805. He studied at Dorpat and Berlin, and became professor of philosophy at Halle in 1836. He wrote several important works on philosophy, psychology, logic and metaphysics, among others are, *Versuch einer Wissenschaftlichen Darstellung der Geschichte der neueren Philosophie* (1834–53); *Grundriss der Logik und Metaphysik* (1864). An English translation of which last, by W. S. Hough, appeared in London in 1893. He died at Halle, June 12, 1892.

EREBUS, Mount, and TERROR, Mount, two volcanos, on South Victoria Land, in lat. 78° 10′ S., long. 169° 45′ E., rising 12,367, and 10,900 feet above the sea, respectively. They were discovered in 1841 by Sir James Ross, in command of the *Erebus* and *Terror*, who named them after his vessels.

ERECHTHEUM. See Athens, Vol. III, p. 6; also Architecture, Vol. II, p. 412.

EREMACAUSIS. See Fermentation, Vol. IX, p. 98.

ERETRIA. See Eubœa, Vol. VIII, p. 649.

ERG. See Energy, Vol. VIII, p. 206.

ERGASTERIA, a mining town of eastern Greece, near Cape Colonna, with ancient lead and silver works, reopened in 1864. The scoriæ or refuse heaps from the mines at Laurium are brought here and resmelted, yielding annually more than ten thousand tons of lead and a large amount of silver. The smelting-works give employment to more than three thousand operatives. Population, 6,500.

ERGOTISM. See Pathology, Vol. XVIII, p. 467.

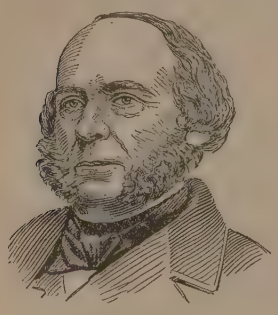
ERIC, a name of a series of kings of Sweden who ruled at intervals from 1154 to 1568. See Sweden, Vol. XXII, pp. 745–748.

ERICACEÆ or HEATHS, a large, widely distributed order of corallifloral dicotyledons, chiefly small shrubs, of the species *Erica*. See Horticulture, Vol. XII, p. 263.

ERICHSEN, John Eric, an English surgeon;

born July 19, 1818; was educated at the Mansion House, Hammersmith, and University College, London. In 1850 he was appointed professor of surgery at University College, later became surgeon-extraordinary to the Queen, and in 1887 president of University College. Dr. Erichsen became connected with various medical societies, both in Europe and America, and wrote a number of works; among them, *Experimental Inquiry into the Nature and Treatment of Asphyxia* (1845) and *Science and Art of Surgery*, which has gone through nine large editions in England and America, and was translated into many languages. He died in Folkestone, England, September 23, 1806.

ERICSSON, JOHN, a Swedish-American engineer; born at Långbanshyttan, Sweden, July 31, 1803. At the age of 12 he became an engineer cadet, and at 17 entered the Swedish army; in 1827 he was promoted captain. In 1828 he constructed a flame-engine, and went to London to introduce it, resigning his captaincy in the army. He also produced, in succession, an instrument for sea-sounding, a hydrostatic weighing-machine, and a tubular steam-boiler, besides other important devices. In 1829 he invented a new steam-fire-engine. In 1833 he conconstructed the caloric engine, and in 1853 the ship *Ericsson*, of 2,000 tons, propelled by this motor. In 1836 Ericsson invented and patented the screw propeller; in 1837 he constructed a vessel having twin-screw propellers; and in 1839 he removed to the United States, where, in 1841, he designed for the government the screw-propelled warship *Princeton*. This was the pioneer screw warship. She carried a 12-inch wrought-iron gun, designed by Ericsson, and a wrought-iron gun-carriage, which took up the recoil without breaking. To the London exhibition of 1851 he contributed several philosophical instruments—a pyrometer, an alarm-barometer, a sea-lead, and other devices. In 1861 he built for the United States government, in one hundred days, the ironclad *Monitor*, which, on March 9, 1862, in Hampton Roads, had the best of an engagement with the Confederate ironclad ram *Virginia*, which had been re-named as such when constructed of the material of the *Merrimac*. In 1881 he built for the United States a vessel called the *Destroyer*. His recent scientific investigations included computations of the influences that retard the earth's rotary motion, and of the intensity of solar heat. He died in New York City, March 8, 1889. In compliance with his own wish, and the request of the Swedish Government Ericsson's remains were taken to his native land. With distinguished honors his remains were transferred in the United States ship *Baltimore* to Stockholm, where they were received with like honors, and conveyed to their resting-place in the town of his birth.



JOHN ERICSSON.

ERICSSON, NILS, a Swedish engineer, brother of John Ericsson, was born at Långbanshyttan, Jan. 31, 1802. In 1832 he became major in the engineering corps of the Swedish army; was afterward head of the mechanical corps in the navy, and from 1855 to 1863 had charge of the construction of Swedish railroads. He was also engineer of the Saima canal, in Finland, and of the locks near Stockholm and at Trollhättan. In recognition of his services he was knighted in 1854, and in 1862 was made a baron. He was for a time a member of the Swedish Diet. He died in Stockholm, Sept. 8, 1870.

ERIE, a city and the capital of Neosho County, southeastern Kansas, on the Neosho River, and on the Atchison, Topeka and Santa Fé, and Missouri, Kansas and Texas railroads, 33 miles S.E. of Fort Scott. The river supplies ample water-power, which is used in running lumber and flour mills. It ships large quantities of grain and live-stock. Population 1895, 1,225.

ERIE, a city of northwestern Pennsylvania, and capital of Erie County, on Lake Erie, at an excellent habor, the only lake harbor in Pennsylvania, from which a first-class line of propeller boats runs to points on the upper lakes. The imports are chiefly grain, lumber, iron ore, limestone and plaster; the exports, bituminous and anthracite coal, engines, boilers and other articles manufactured there. The railroads are the Pennsylvania, the Lake Shore and Michigan Southern, and the New York, Chicago and St. Louis. The city has an area of six square miles, with 150 miles of streets, wide, well paved and lighted. Many of the streets are paved with Medina stone and asphalt, and lined with elegant mansions surrounded by beautiful gardens and shrubbery. On State Street are handsome fountains, and a soldiers' monument costing $10,000. An elaborate system of water-works supplies the city with an abundance of pure water. The stand-pipe at the pumps is 251 feet high, said to be the highest water-pipe in the world. The government building, completed in 1889, is a notable structure, 114 x 72 feet, built of stone and granite. The city hall is 64 x 124 feet, 88 feet in height, and cost $300,000. The courthouse is 61 x 132 feet, and cost $60,000. An addition has recently been constructed, at a cost of $50,000. The charitable institutions are: Soldiers' and Sailors' Home, Home for the Friendless, Hamot Hospital and St. Vincent's Hospital. An excellent system of public schools is maintained. The Central High School building is 270 x 120 feet, seats 1,500 pupils, and cost $100,000. Other educational institutions are: Clark's Business College, the Erie Academy, the Erie Art School and St. Benedictine (Roman Catholic) Academy. Erie is an important manufacturing center, and the market for a rich farming country. Its most important products are foundry and machine-shop products, clothing, flouring and grist mill products, lumber products, printing and publishing work, bricks and tiles,

liquors, tobacco, cigars and cigarettes. The manufactories employ an average of 7,050 hands, paying as wages $4,000,000 annually. The value of the total products is nearly $13,000,000. Population 1880, 27,757; 1890, 39,699. See also ERIE, Vol. VIII, p. 522.

ERIE, BATTLE OF LAKE. See PERRY, OLIVER HAZARD, in these Supplements.

ERIE, LAKE. See LAKE, Vol. XIV, p. 217; and ST. LAWRENCE, Vol. XXI, pp. 179, 182.

ERIE CANAL. Among the canals of the United States, the Erie Canal, running from Buffalo, on Lake Erie, to Albany, on the Hudson River, a distance of 352 miles, is the largest and most important.

The question of building a canal which would connect the newly opened Western territory with the Atlantic seaboard was widely discussed in New York during the early years of our national existence, and in 1810 a commission of seven members, with Gouverneur Morris, to whom is attributed the first suggestion of the Erie Canal, at the head, was appointed by the New York legislature.

Several reports were made by this commission, but the outbreak of the War of 1812 caused a suspension of operations until 1815, when De Witt Clinton, who had been a member of the commission of 1810, memorialized the legislature in favor of the construction of the Erie Canal, and in 1817 a bill was passed authorizing the undertaking. On July 3, 1817, ground for the new canal was broken, by James Richardson, near Rome, New York, and on Nov. 4, 1825, the first fleet of canal-boats came through from Buffalo, Governor Clinton being on the first boat.

The canal, opened as it was at a time when railroad transportation was unknown, began at once to revolutionize the internal trade of America, and gave an impetus to the commercial enterprises of New York City, which in a few years placed her at the head of American cities. The reduction, both in time of travel and cost of transportation, was large, the time from Buffalo to Albany being shortened from twenty days to ten days, and the cost of carrying freight from Buffalo to New York was reduced from $100 per ton to $10, and later to $3.

As originally constructed, the canal had a surface width of 40 feet and a depth of four feet, and cost $7,602,000, but subsequent enlargements gave it an average surface width of 70 feet and a depth of 7 feet.

It is structurally one of the most scientific canals in the world, having, in its course, 57 double and 15 single locks; is carried over the Mohawk River twice on stone aqueducts; crosses a ridge 188 feet high at West Troy by means of 16 double lift-locks; and is raised 20 feet at Albany by means of two double locks, each 110 by 18 feet.

The propelling power for the boats consisted almost entirely of horses until 1871, when a number of steam-propelled boats were introduced, and from that time gradually increased in number.

The organization of the Niagara Falls Electric Power Company brought about an attempt to navigate the canal-boats by electric motive power, the experiments proving fairly successful. (See also ST. LAWRENCE, Vol. XXI, p. 179, and CANALS, in these Supplements.)

ERIGERON, a genus of plants of the family *Compositæ*, having heads of many florets, the ray numerous, in several rows, of a different color from those of the disk. *E. Philadelphicum*, a native of North America, with pale purple ray, and a fetid smell, is valued in the United States as a diuretic. *E. Canadense*, the "horseweed" or "butterweed," with inconspicuous rays, is one of our worst weeds. The species are known, in general, as "fleabanes," and are very closely allied to the asters.

ERIK THE RED, and his son LEIF ERIKSON. See GREENLAND, Vol. XI, p. 171; and LEIF ERIKSON, in these Supplements.

ERIN, a town and the capital of Houston County, northwestern Tennessee, 52 miles W. of Nashville, on the Louisville and Nashville railroad. It has considerable manufacturing activity, producing staves, lumber and shingles, flour, and machine-shop work. Population 1890, 789.

ERINACEIDÆ. See MAMMALIA, Vol. XV, p. 402.

ERIOCAULONACEÆ, a family of monocotyledonous plants, and containing about 350 known species, many of which are aquatic or marsh plants. They are chiefly tropical; but the genera *Eriocaulon*, *Pæpalanthus*, etc., have representatives in the temperate regions of both hemispheres. They are plants with a cluster of root-leaves and a slender scape bearing a head of white-bearded flowers, and are popularly known as "pipeworts."

ERIODENDRON, a genus of trees of the family *Malvaceæ*, natives of tropical countries. Their thick woody capsules contain a kind of wool surrounding the seeds. They are sometimes called "wool-trees," or "silk-cotton trees."

ERITH, a town of Kent, on the banks of the Thames, 14 miles by rail S.W. of London. It was once a summer resort for Londoners, and is now the headquarters of several of the lesser yacht clubs. It has a much-restored church, rich in brasses. After the signing of the Magna Charta, the barons met Hubert de Burgh at the old church of Erith and arranged the conditions of peace. Here the *Grace de Dieu*, a fine battleship, was built by Henry VIII in 1515. Population, 13,414.

ERITREA. See AFRICA, in these Supplements, p. 67.

ERMELAND OR ERMLAND, one of the eleven districts of the old province of Prussia, extending inland from the Frisches Haff. In 1250 it was created one of the four bishoprics of the country of the Teutonic Knights. In 1354 the bishop of Ermeland, who had been subject to the archbishop of Riga, was made directly dependent upon the pope, and elevated to the position of a prince of the empire. In 1466 West Prussia

was transferred to Poland, and the bishop of Ermeland became a member of the Polish senate. Since 1722 Ermeland has again been Prussian. It is now in Königsberg province, and is a Roman Catholic diocese, with the bishop's see at Frauenberg.

ERMENONVILLE, a village in Oise department, France, celebrated for its beautiful and extensive parks, and as being the burial-place of Rousseau. It was purchased by Stanislaus de Girardin, and is preserved for lovers of art, nature, and historical monuments.

ERNE, a river and 2 loughs of Ulster, Ireland. The river rises near Cross Keys, Cavan, flows west into Lough Gowna, then northwest through a succession of lakes, the principal of which are the Ernes, the river itself being a broad, clear stream. It empties into Donegal Bay; length 75 miles. The Erne loughs are surrounded by beautiful scenery and have numerous islands. The lower is 20 miles long, 7 wide, and about 200 feet deep. The upper is 12 miles long and 3 wide. Several steamboats ply on the lakes and river, but the river has several cataracts.

ERNE OR EARN. See EAGLE, Vol. VII, 589–90.

ERNEST (ERNST) I, surnamed THE PIOUS, Duke of Saxe-Gotha and Altenburg, and founder of the House of Gotha; born in the castle of Altenburg, Dec. 24, 1601, the ninth of ten brothers, the youngest of whom was the famous Bernard of Saxe-Weimar. After the arrival of Gustavus Adolphus in Germany, Ernest entered the Swedish service, and in various engagements displayed great courage and skill, completing the victory of the Protestants at Lützen, after the fall of Gustavus. After the battle of Nördlingen in 1634, he withdrew from the army, and devoted himself to restoring the prosperity of his duchy. He was a zealous Protestant and a ruler of great wisdom and activity. Died in 1675.

ERNEST II, AUGUSTUS–ERNEST CHARLES JOHN LEOPOLD ALEXANDER EDWARD, Duke of Saxe-Coburg and Gotha, who reigned as Ernest II, was born at Coburg, June 21, 1818; succeeded his father, Jan. 29, 1844. His younger brother, Albert, married Queen Victoria of England. In 1863 his name was put forward as a candidate for the vacant crown of Greece, but for state reasons he declined it. He labored much to promote German unity, and gave a stimulus to those liberal movements which induced the Emperor of Austria to make concessions to his subjects. He was an accomplished musician, and composed the operas *Zaïre Casilda; Sainte Claire; Diane de Solanges*, etc. Died at Reinhardsbrunn, Aug. 22, 1893.

ERNST, OSWALD HUBERT, an American engineer; born near Cincinnati, Ohio, June 27, 1842; educated at Harvard and the United States Military Academy, where he graduated in 1864; commissioned first lieutenant in the engineers, and served as assistant chief engineer of the army of the Tennessee till the close of the Atlanta campaign. In 1870 he was astronomer on the expedition sent to Spain by the United States to view the solar eclipse. He later became instructor of engineering at the Military Academy, and since 1880 has acted as engineer to various boards having large public works in charge. He published *Manual of Practical Military Engineering* (1873).

ERNEST AUGUSTUS, kings of Hanover. See HANOVER, Vol. XI, p. 447.

ERNESTINE HOUSE. See SAXONY, Vol. XXI, p. 353.

EROS, a remarkable minor planet discovered at Berlin by Herr G. Witt, Aug. 13, 1898, and at first named DQ. After its discovery it was found registered on several photographs taken at Harvard since 1893. Its mean distance from the sun is 1.460, that of the Earth being unity, and that of Mars 1.524; eccentricity 0.22865, its orbit lying partly within and partly outside that of Mars; period of revolution 644.7 days, that of Mars being 687. Its diameter is probably less than 20 miles. Every 30 years it approaches the earth within 14,000,000 miles, and it will then afford the most accurate known means of measuring the sun's distance. It will then be of about the sixth or seventh magnitude, and almost visible to the naked eye. One of these close approaches occurred in 1894; the next will occur in 1924. In 1900 a rather favorable opposition will take place, the planet being about 31,000,000 miles distant, or nearly 4,000,000 less than the distance of Mars at its closest approach.

EROSION. See GEOLOGY, Vol. X, 282, 285, 373.

ERROR, WRIT OF, a judicial writ issued by a court of superior jurisdiction, directed to a court of record which has entered final judgment in some legal proceeding, requiring such court to examine the record in such proceeding, or to send the record to some court of appellate jurisdiction therein named, in order that some alleged error in the proceedings may be corrected. Its object is to correct errors of law committed by the trial court, and it can be used only when the error appears in the record. It is in the nature of a new action commenced in the higher court. See WRIT, Vol. XXIV, p. 692.

ERSE. See GAELIC LANGUAGE, Vol. X, pp. 6–8.

ERYNGIUM, a genus of plants of the family *Umbelliferæ*, having heads instead of umbels, a leafy involucre, and scaly or bristly fruit. The species are numerous, mostly natives of the warmer temperate parts of the world, with simple or divided leaves, which are usually more or less spiny. In the United States two species, *E. yuccæfolium* and *E. Virginianum*, are found in the northern states east of the Mississippi; but the large display of the genus is in the Mexican border region.

ERYSIMUM, a genus of plants of the family *Cruciferæ*. The pod is four-sided. *E. cheiranthoides*, a branching annual, about eighteen inches high, with lanceolate, scarcely toothed leaves, and small yellow flowers, is found in North America and many parts of Europe. *E. asperum*, the Western wallflower, is the most abundant and showy species of the United States, with large, bright yellow or orange flowers, varying to purple.

ERYX, the typical genus of the family of sand-snakes. It is found in Europe and Asia. The species kept in confinement by the serpent-charm-

ers of India is perfectly harmless, but is considered dangerous by the ignorant natives.

ESBJERG, a port of Denmark, 56 miles W. of Fredericia, with a large export trade in cattle, mostly to England. Its harbor, the only important one on the W. coast of Jutland, was constructed by the state at great expense in 1868–74. Pop. 4,111.

ESBJÖRN, Lars P., a Swedish theologian, founder of the Swedish Lutheran Church in America; born in Sweden, Oct. 16, 1808; educated at Upsala, and in 1849 emigrated to the United States. He held pastorates first at Andover, and afterward at Princeton, Ill., and in 1858–60 was a professor in the Illinois State University. In 1860 he founded the Swedish Augustana Synod, which in 1893 numbered 84,000 communicants. He returned to Sweden in 1862, where he died, July 2, 1870.

ESCALADE, in siege operations, a mode of gaining admission within the enemy's works. It consists in advancing over the glacis and covered way; descending, if necessary, into the ditch by means of ladders, and ascending to the parapet of the curtain and bastions by the same ladders, differently placed. The leaders of an escalade constitute a "forlorn hope." Among the most famous escalades are those at Adrianople by the Goths; Corfu in 1717; and Badajos in 1812. The Duke of Savoy's attempt to capture Geneva in 1602 is known in history as "the Escalade."

ESCANABA, a city, the capital of Delta Co., Mich., at the north end of Green Bay; has a good harbor, and does a large shipping business, sending out annually 500,000 tons of Lake Superior iron ores. Pop. 1895, 8,124.

ESCAPE, in law, the evasion of legal restraint; departure from the custody of a sheriff or other officer, or transcending the limits of confinement without due process of law; also the liability of a sheriff for suffering a prisoner to escape.

ESCAPEMENT. See Clocks, Vol. VI, pp. 17–29; and Watch, Vol. XXIV, pp. 396–97.

ESCARPMENT, a long line of cliff formed by the outcrop of a relatively hard stratum of rock imbedded among more yielding strata. See Scotland, Vol. XXI, pp. 525–26.

ESCARS or ESKERS, large heaps of gravel, consisting chiefly of Carboniferous limestone, which were accumulated during the Pleistocene period. The gravel is often heaped into narrow ridges, 40 to 80 feet high and from one to 20 miles long. See Geology, Vol. X, p. 368.

ESCHEAT, the reverting of lands to their original owner, caused by some unforseen contingency. In the United States escheat can only arise upon the death of the owner intestate and without heirs, or, in some states, where the owner is an alien. The subject of escheat is governed by statute; but, as a rule, land escheats to the state, generally to some purpose specified in the statutes. In some states escheated estates go into the school fund.

ESCHENBACH, Wolfram von. See Germany, Vol. X, p. 524.

ESCHOLTZ BAY, a portion of the Arctic Ocean, in Alaska, forming the innermost part of Kotzebue Sound, the first great inlet to the northeast of Bering Strait. It is about long. 161° W., lat. 66° N., being barely on the outside of the polar circle; the Buckland River flows into it. It is worthy of notice on account of its fossil remains, which, though common on the northern coast of Siberia, are rare on that of the New Continent.

ESCHSCHOLTZIA, a small genus of *Papaveraceæ* or "poppies," natives of the Californian region. *E. Californica*, well known in cultivation, is an annual, with pale dissected leaves and long peduncles, bearing large flowers, which are various shades of yellow, or even white. The calyx is like an extinguisher, which rests upon a top-shaped dilatation at the base of the flower, and is forced off as the petals unfold.

ESCOBEDO, Mariano, a Mexican soldier; born in Galeana, Nueva Leon, Jan. 12, 1827. During the war with the United States (1847–48) he armed his subordinates, and attacked small bodies of the invaders; later he fought with the Mexican army at Palo Alto and Resaca de Guerrero. In 1861 Escobedo attained the rank of brigadier-general. In 1862, during the French interference in Mexican affairs, he fought at Puebla and at the hill of Cerro del Borrego. Later he took part in the defense of Puebla against the French forces. In June, 1864, when the empire under Maximilian was established, Escobedo made a short resistance to the new order of things. In November, 1865, he surprised the garrison of Monterey. In June, 1866, the forces of Escobedo captured Saltillo, and in July Juarez established his government in that city. In December, 1866, Escobedo marched on San Luis Potosi with an army of fifteen thousand men. On Feb. 1, 1867, he attacked the imperial general, Miramón, and destroyed half his army. At Querétaro the Emperor Maximilian, with his two generals, Mejia and Castillo, became prisoners. A court-martial was held by order of Juarez, and the emperor promptly condemned and shot. In 1875 Escobedo was commander-in-chief of the frontier department of the east, and in 1876 he served as Secretary of War under Lerdo, but upon the triumph of Diaz he went to New York City, and later proceeded to San Antonio, Texas, to renew Mexican agitation on his own behalf. From there he ventured to enter Mexico, where he was arrested, and sent as a prisoner to the capital. Here he was tried by court-martial, and narrowly escaped being declared guilty of conspiracy against the government. In 1879 he again went to New York City, on "private business," but in August, 1880, returned to Mexico. From 1882 until 1883 he was president of the supreme military court of justice, but in 1884 went into retirement.

ESCOSURA, Patricio, a Spanish statesman and author; born in Madrid, Nov. 5, 1807. In early life he was in frequent political troubles, resulting in his being thrice exiled. He served for a number of years in the Spanish army, and held the offices, at various times, of Secretary of State, ambassador to Portugal, Minister of the Interior, and ambassador to Germany. He was the author of romances entitled *El Conde de Candespina*

(1832), and *Ni Rey, Ni Roque* (1835); of several dramas, and a *Constitutional History of England* in Spanish. He died at Madrid, Jan. 22, 1878.

ESCROW, a deed or other obligation in writing, delivered to a third person, to be held by him and delivered to the person in whose favor the obligation is made, upon the happening of a certain contingency. An instrument delivered as an escrow does not become operative until conditions are complied with, but takes effect only upon the final delivery.

ESDRAELON, PLAIN OF, also known as valley of Jezreel. See PALESTINE, Vol. XVIII, pp. 171–72.

ESK, four Scotch rivers. 1. Rises in Forfarshire, flows east, becomes the boundary between that and Kincardineshire, and enters the North Sea a little above Charlton. 2. Rises in the same county, flows east into the Montrose Basin, three miles south of the preceding. 3. A small stream of Midlothian, which rises in the western part, flows northeast, and enters the Firth of Forth at Musselburgh; length about 25 miles. 4. Rises in Dumfriesshire, on the south slope of Wind Fell, and flows south-southeast into the Liddel, eight miles above its mouth. Length 40 miles. The first two rise in the Binchinnin Mountains, and are about 50 miles long. They flow through picturesque scenery, and afford good fishing.

ESKILSTUNA, a town in Södermanland province, Sweden, noted for its steel and iron manufactures, copper and brass wares, etc. Pop. 1897, 12,971.

ESMARCH, JOHANNES FRIEDRICH AUGUST, a German surgeon; born at Tönning, in Schleswig-Holstein, Jan. 9, 1823. He was educated in the gymnasia at Rendsburg and Flensburg, and studied medicine at Kiel and Göttingen. During the Danish war of 1848 he served as assistant surgeon, later as adjutant of Stromeyer, and in 1850 was promoted to be chief surgeon. He was appointed professor and director of the surgical clinic at Kiel in 1857, and director of the hospital at Kiel in 1860, became a member of the hospital commission at Berlin in 1866, and during the Franco-German war of 1870 was surgeon-general and consulting surgeon of the army. The latter position he resigned in 1871, and since his return to Kiel he has been constantly engaged in his work as professor and surgeon. He married twice, his second wife being the Princess Henrietta of Schleswig-Holstein. He is known to the medical profession throughout the world by his great invention in surgery, the bloodless method of operating on the extremities. Among his contributions to medical literature may be mentioned *Der Erste Verband auf dem Schlachtfeld* (1870); *Verband Platz und Feldlazarett* (1871); *Handbuch der Kriegschirurgischen Technik* (1885–86).

ESMERALDAS, the name of a province of Ecuador, and of its capital and principal river. The province lies in the northwestern corner of the republic. It is a country rich in soil and natural resources; has a large ocean front with many ports. Its rivers, which are many, and navigable for long distances, often carry gold in their sands. Its forests contain the finest timber, and its plains cotton, sugar-cane and other products. Its tobacco is of a superior quality. The Esmeraldas River, formed in the eastern part of the province by the confluence of the Gualtabamba and the Toachi, flows north into the Pacific Ocean. It is navigable for 60 miles, almost its whole length. At its mouth is the capital of the province, a small town of 800 inhabitants.

ESOCIDÆ, a family of fishes. See PIKE, Vol. XIX, p. 88.

ESPARTERO, BALDOMERO, a Spanish soldier and statesman; born at Granatula, La Mancha, Spain, Feb. 27, 1792. He enlisted at sixteen and was engaged in active service for many years. In 1824 he went to Peru as chief of staff, but was captured and held a prisoner. In the civil war which followed the death of Ferdinand VII in 1833, Espartero took the side of Isabella against Don Carlos, and for his success in this struggle he was made captain-general and a grandee of Spain. In 1840 he was made premier, and the next year regent. In 1843 Narvaez proclaimed the young queen of age, and Espartero escaped to England, where he resided four years. In 1854 he again became prime minister, but resigned in 1856. He took part in the revolution of 1868, which resulted in the expulsion of Isabella II, and supported the republic. After this he was mentioned twice as a candidate for the vacant throne, but refused it, owing to his age. He died at Logroño, Jan. 9, 1879.

ESPINASSE, JULIE JEANNE ELEONORE, French conversationalist and letter-writer; born at Lyons, Nov. 19, 1732. Having received a good education, in 1752 she went to Paris, where she became *demoiselle de compagnie* to Madame du Deffaud, at that time leader of one of the most brilliant *salons* in Paris. With her she remained for nearly ten years, when a rupture resulted from the admiration which the young and beautiful *demoiselle* attracted. She gained the affection of D'Alembert, the famous encyclopædist, and in 1762 became mistress of a *salon* which was frequented by many of the leading literary lights of Paris. Her *Lettres*, published in 1809, are much admired. She died in Paris, May 23, 1776.

ESPIRITO SANTO, a province, bay and city. See VICTORIA, Vol. XXIV, p. 218.

ESPLANADE, the open space intentionally left between the houses of a city and the glacis of its citadel. It requires to be at least 800 paces broad, that the enemy, in case of getting possession of the town, may not be able to assail the citadel under cover of the nearest houses. The citadel must therefore command the esplanade, and be able to send a direct fire into the streets opening upon it. In the older usage of the term, it is often applied to the glacis of the counterscarp, or the slope of the parapet of the covered way toward the country.

ESPY, JAMES POLLARD, an American meteorologist; born in Washington County, Pennsylvania, May 9, 1785. In 1808 he became principal of the classical academy in Cumberland, and later was admitted to the Ohio bar. In 1817

he became a professor in the classical department of the Franklin Institute, Philadelphia. Later he advanced the theory that every great atmospheric disturbance begins with the uprising of air that has been rarefied by heat. In 1840 he visited Europe and presented his views to foreign scientists for examination. They reported favorably on them, but subsequent researches have led to important modifications of his views, and they have finally been discarded for Redfield's rotary theory. Espy entertained a belief that rains could be brought on at any time by means of great fires, kept up long enough, and over a sufficiently large area, to initiate a powerful upward movement. In 1843 he received an appointment under the War Department and instituted a service of daily bulletins on the condition of the weather in different localities, which has since developed into an important branch of the Agricultural Department. He published several volumes of weather reports, besides *Philosophy of Storms*. He died at Cincinnati, Jan. 24, 1860.

ESQUIMAULT, a harbor and naval station on the southeast of VANCOUVER ISLAND; q.v., Vol. XXIV, p. 57.

ESSAYS AND REVIEWS, the title of a remarkable volume published in 1860, containing the following seven papers: (1) *The Education of the World*, by Dr. Temple; (2) *Bunsen's Biblical Researches*, by Dr. Rowland Williams; (3) *On the Study of the Evidences of Christianity*, by Professor Baden Powell; (4) *The National Church*, by H. B. Wilson; (5) *The Mosaic Cosmogony*, by C. W. Goodwin; (6) *Tendencies of Religious Thought in England, 1688–1750*, by Mark Pattison; (7) *The Interpretation of Scripture*, by Prof. B. Jowett. The articles were all in more or less opposition to the tractarian principle of Oxford, and may be deemed representative of the "Broad Church" views. All the writers, except Mr. Goodwin, were clergymen of the Church of England; and their work, which was censured for its heterodox views by nearly all the bishops, and formally condemned by convocation in 1864, caused much excitement and controversy. Dr. Williams and Mr. Wilson were sentenced by the ecclesiastical courts to suspension for a year, but on appeal the sentence was reversed by the Privy Council, and Dr. Temple's election to the see of Exeter in 1869 was also ineffectually opposed.

ESSENTIAL OILS. See OILS, Vol. XVII, pp. 747–749.

ESSEQUIBO. See GUIANA, Vol. XI, p. 250.

ESSEX, a manufacturing town of Middlesex County, south-central Connecticut, on the Connecticut River, seven miles above its mouth, and on the New York, New Haven and Hartford railroad. Carriages are its chief manufactures. Pop., 2,035.

ESSEX JUNTO, THE, a name first applied by John Hancock, in 1781, to a group of leaders of Essex County, Massachusetts, and their adherents. They were upholders of the commercial interests of the country, and desired a stronger Federal government. Upon the organization of the Federal party they at once fell in line and became the extreme members of that party. They were accused by President Adams of trying to force a war with France in 1798–99, and during the embargo period the name became a synonym for New England Federalism. Among the members of the Junto were George Cabot, the Lowells, Timothy Pickering, Theophilus Parsons, Stephen Higginson, Benjamin Goodhue, and Fisher Ames.

ESSLING, a village of Austria, on the Danube, seven miles below Vienna. A bloody battle was fought here in May, 1809, between Napoleon and the Austrians. See NAPOLEON, Vol. XVII, p. 214.

ESSONITE. See GARNET, Vol. X, p. 82.

ESZTERHÁZY FAMILY. See ESZTERHÁZY, Vol. VIII, p. 564.

ESTHERVILLE, a town and the capital of Emmet County, northern Iowa, situated on the west branch of the Des Moines River. It has excellent educational advantages; grist and saw mills, a machine-shop and a wind-mill factory. The business of the locality is farming and stock-raising. Population 1895, 2,498.

ESTRAY, in law, a horse, sheep or other domestic animal found wandering, the owner of which is unknown. By the common law of England, estrays belonged to the sovereign or lord of the manor. By statute law an estray becomes the property of the person in whose inclosure it is found, if not claimed by the owner within a year and a day. In the United States the law of estrays varies in the different states.

ESTRÉES, GABRIELLE D', born about 1571; mistress of Henry IV of France, with whom she became acquainted in 1590. She was married to a gentleman of Picardy named Liancourt, from whom she soon separated. She acquired the titles of Marquise de Monceaux and Duchesse de Beaufort. The king was so fond of her that, in spite of the opposition of Sully, he was about to divorce his consort, Marguerite de Valois, that he might marry Mme. de Liancourt, when the latter suddenly died at Paris, April 10, 1599.

ESTUARY. See RIVER-ENGINEERING, Vol. XX, p. 576.

ÉTANG DE BERRE, a salt lake of southeastern France, in the south of the department of Bouches-du-Rhone, communicating with the sea by a narrow channel, called Port-de-Bouc. It is 11 miles long by 9 broad at its widest part. This lake contains great quantities of eels and other fish. Salt-works are in operation on its banks.

ETCHING. See ENGRAVING, Vol. VIII, pp. 443–445.

ETESIAN WINDS. See GREECE, Vol. XI, p. 83.

ÉTEX, ANTOINE, a French artist; born at Paris, March 20, 1808. He early devoted himself to art, receiving instruction from Ingres and Duban, and in 1828 he secured the second *prix de Rome* by his *Hyacinthus Slain by Apollo*. His statue of Cain, exhibited at the Salon of 1833, secured him a commission for two groups for the Arc de l'Étoile, and in 1841 his *Tomb of Géricault* won the decoration of the Legion of Honor. Among his statues are *Hero and Leander*, at the museum

of Caen; *Blanche of Castile*, at Versailles; *Charlemagne*, at the Luxembourg; *Shipwrecked*, exhibited at the Exposition of 1867; *Susanna Surprised at the Bath.* Among his paintings are *Romeo and Juliet; Dante and Beatrice; The Great Men of the United States* (now in city hall, New York); *The Flight to Egypt.* He executed designs for monuments and public works, and engraved a series of ideals from the Greek tragic poets. He died July 17, 1888.

ETHAN ALLEN, Fort, a new army post for the United States army, in the Department of the East, situated 5 miles from Burlington, Vermont. It was named in honor of Ethan Allen, the commander of the "Green Mountain Boys" of the Revolutionary War; was completed in 1895, and garrisoned by four troops of cavalry. The nearest post-office and railway station is at Essex Junction, Vermont, distant two miles from the post.

ETHELREDA, Saint, a daughter of the king of the East Angles, canonized in the seventh century for her saintly virtues. She was the first abbess of Ely, and was noted for her skill in embroidery. Her festival in the calendar is October 17th. Her name was abbreviated popularly or corrupted into St. Audrey.

ETHICAL CULTURE, Society for, a body founded, in 1876, by Felix Adler of New York, to institute a new religion of morality, whose God should be the good, its church the universe, and its heaven to be sought on earth. Its objects are: 1. To teach the supremacy of the morals over all other human ends and interests; 2. To teach that the moral law has an immediate authority, not contingent on the truth of religious beliefs or of philosophical theories; 3. To advance right living. Meetings are held at the usual time of church services. Societies have been formed in New York, Chicago, Philadelphia and St. Louis. In 1886 a convention was held in New York City, and an organization formed, known as the "Union of the Societies for Ethical Culture." The body is numerically small, and has no ecclesiastical polity.

ETHIOPIC LANGUAGE. See Semitic Languages, Vol. XXI, pp. 654, 655.

ETHIOPIC LITERATURE. See Ethiopia, Vol. VIII, pp. 612, 613.

ETHMOID BONE, one of the eight bones which collectively form the cranium. See Anatomy, Vol. I, p. 824.

ETHYLAMINE, a substance strongly resembling ordinary ammonia in odor and other properties. It is found in coal-tar, in the oil obtained during the destructive distillation of bones, in the gases evolved during putrefaction, and may be produced by certain complicated chemical processes. Ethylamine is a mobile liquid of specific gravity 696 (water=1000), and boils at 66° F. It has an alkaline action with coloring matters, forms white fumes with strong acids, and in composition is analogous to gaseous ammonia (NH^3 or NHHH), with one of the atoms of hydrogen replaced by ethyl (C^2H^5), and is represented by the symbol C^2H^7N or NH^2 (C^2 H^5).

ETHYLENE or OLEFIANT GAS. A gaseous compound of carbon and hydrogen (C^2H^4), which can be made from alcohol (C^2H^6O) by removing water (H^2O). It is an important constituent of coal-gas, as the illuminating power of the gas depends chiefly on the proportion of ethylene which it contains.

ETIVE, a sea-loch in the north of Argyleshire, central western Scotland, running inland from the Firth of Lorn, 20 miles E., then N. E., with a width of from a quarter of a mile to three miles. It is bordered by granite in its upper part, and by trap in its lower. Near its mouth there is mica-slate on the north side, and Permian strata on the south. The loch abounds in seals, salmon, porpoises and cod, and is navigable for vessels of one hundred tons. At the south side of the mouth of Loch Etive, on a projecting conglomerate rock 10 to 30 feet high, are the ruins of Dunstaffnage Castle, the ancient stronghold of the Macdougals, a building in the Edwardian style, with walls 400 feet in circumference, 30 to 50 feet high and 10 feet thick, and with three round towers. The scenery, especially in the upper loch, is picturesquely wild.

ETRUSCAN LANGUAGE. See Etruria, Vol. VIII, p. 638.

ETTRICK, a vale, town and river of Scotland. On the banks of the river, James Hogg, the "Ettrick Shepherd," was born. See Selkirk, Vol. XXI, p. 638.

EU, Comte d', Prince Louis Philippe Marie Ferdinand Gaston d'Orléans; born at the Château de Neuilly, in the department of the Seine, April 28, 1842, is the eldest son of the Duc de Nemours, and one of the grandsons of King Louis Philippe. Brought up in exile, he was educated in England, and entered the military service of Spain in 1859, serving in Morocco. Later he joined the artillery college at Segovia, from which he graduated in 1863. In 1864 he married Isabella, the eldest daughter of Dom Pedro II of Brazil. He was made a field-marshal in the Brazilian army in 1865, and in 1869 was appointed commander-in-chief of all the forces on land and sea, a position he retained until the war with Paraguay (begun in 1864) was ended. From 1865 to 1889 he held the post of commander-general of the Brazilian artillery, and was president of various commissions. In the many absences of Dom Pedro from the empire during this period, the Comte d'Eu had the virtual direction of all Brazilian affairs. The fact that Isabella, during the absence of the emperor from Brazil, had acted as regent, and was known to be influenced by the Jesuits and her husband, who, as a foreign prince, was unpopular in the country, led to the revolution of November, 1889, establishing the republic of Brazil and deposing the emperor. The Comte d'Eu, with his wife, accompanied Dom Pedro to Portugal, and has since resided in Europe. His son, Prince Augustus of Saxe-Coburg, the favorite grandson of Dom Pedro, and a young naval officer, became demented as a result of the overthrow of the empire.

EUCHLORINE. See CHEMISTRY, Vol. V, p. 495.

EUCLASE. See MINERALOGY, Vol. XVI, p. 409.

EUDEMIAN ETHICS. See PERIPATETICS, Vol. XVIII, p. 545.

EUDIOMETER, a graduated glass tube closed at the upper end and open below. Near the upper end two platinum wires are sealed in, which project into the tube and serve as electrodes. The instrument is used to study the combination of oxygen and hydrogen by collecting the gases above mercury and exploding the mixture with the discharge from a Leyden jar or an induction coil.

EUFAULA, a city of Barbour County, southeastern Alabama, on the Chattahoochee River, opposite Georgetown, Georgia, on the Georgia Central railroad. It is a winter health-resort, has a college for women, water-works, bagging factory, fair-ground, and is a great cotton-shipping point. Population 1890, 4,394.

EUGANEAN HILLS, a range of well-wooded hills, with a north and south axis, lying southwest of Padua, in northern Italy. They owe their origin to eruptions of trachyte during the Jurassic period. See ITALY, Vol. XIII, p. 443.

EUGENE CITY, the capital of Lane County, central western Oregon, 71 miles S. of Salem, on the west bank of the Willamette River, at the head of navigation, and on the Southern Pacific railroad. It is a business and educational center, and contains the University of Oregon. It has importance in manufacturing, producing brewery and tannery products, iron, flour and lumber, and also in trading, shipping salmon, live-stock, grain, hops and fruit. Population 1890, 3,958.

EUGENIA, a large genus of plants of the family *Myrtaceæ*, or "myrtles," having a four-parted calyx, four petals and one or two celled berry, with one seed in each cell. The species are trees and shrubs, natives chiefly of tropical and subtropical countries.

EUGÉNIE, MARIE DE MONTIJO, ex-empress of France; born in Granada, Spain, May 5, 1826.

EX-EMPRESS EUGÉNIE.

She was by birth Eugénie Marie de Guzman, and was known in her youth as Countess of Teba. Her father, Count of Montijo, was a Spanish army officer who died in 1839. Her mother was Maria Manuela Kirkpatrick, whose father, a gentleman of Scotch descent, was English consul at Malaga. The future empress received her education in Spain, France and England, and was thus possessed of accomplishments more numerous and more varied than usually fall to the lot of Spanish girls. She is said to have first met Louis Napoleon (Napoleon III) in London, where he was then in exile. She was taken to Paris in 1851, where she attracted great attention at the balls given at the Tuileries. Napoleon's ambition for an alliance with some reigning house, having been thwarted, he married the Countess of Teba, Jan. 30, 1853. As empress she became the leader of fashion in Europe, and maintained a brilliant court, but, not content with her triumphs in this line, she interfered in politics. As a zealous Roman Catholic she used her influence to advance the interests of the pope, and to her was popularly attributed her husband's Mexican and papal policy. She acted as regent in 1859 when Napoleon was in Italy, in 1865 during his Algerian tour, and again in the interval between his departure for the seat of war, July 23, 1870, and the proclamation of a republic, Sept. 4, 1870. She then fled to England and took up her abode at Chiselhurst, but later removed to Farnborough. Napoleon III died in less than three years after his removal to England. Her only son, the Prince Imperial, born March 16, 1856, completed his military education in England, and in 1879, while serving as a volunteer in the Zulu war, in South Africa, was killed, an occurrence which greatly saddened the latter years of his mother's life. Eugénie is the author of *Some Recollections from My Life* (1885).

EUHEMEROS. See EVEMERUS, Vol. VIII, p. 735.

EUMENIDES. See ERINYES, Vol. VIII, p. 524.

EUMOLPUS, a mythical bard of Greece and founder of the "Eleusinian Mysteries." See MYSTERIES, Vol. XVII, pp. 126, 127.

EUOMPHALUS, a large genus of fossil gasteropodous shells, characterized by depressed and discoidal shell, with angled or coronated whorls, five-sided mouth, and very large umbilicus. These mollusks appear in the Silurian, and range through all formations until they disappear in the Triassic. A large number of species have been recognized.

EUONYMUS, a genus of shrubs of the family *Celastraceæ*, natives of all north temperate regions. An extract is obtained from the bark of the *Euonymus atropurpureus*, the "spindle tree," or "wahoo," or "burning bush," a shrub indigenous to the United States, and is used in America as a tonic and diuretic, and in Britain for its stimulant action on the liver. *E. Americanus* is the "American strawberry bush." *E. Japonicus* is cultivated from Japan, under the name of "Chinese box." The flowers of the genus are inconspicuous, but the fruit is ornamental, especially when it opens and displays the seeds enveloped in the scarlet aril.

EUPATORIUM, a genus of plants of the family *Compositæ*, having small heads in corymbs, flowers all tubular, club-shaped stigmas, imbricated bracts, a naked receptacle and a hairy pappus. The species are numerous, and mostly American. Thoroughwort (*E. perfoliatum*), a species having the opposite leaves joined at the base, is used as a medicine.

EUPHORBIACEÆ, a very extensive family of dicotyledons, containing over three thousand five hundred known species—trees, shrubs and herbaceous plants—of the most extraordinarily varied, often even cactus-like, habit. They abound in warm countries, and mostly in tropical America. The few species found in the colder parts of the world are all herbaceous. The *Euphorbiaceæ* usu-

ally abound in an acrid and poisonous milky juice; although there are species whose juice is bland, or becomes so through the application of heat. Many of them are valued for their medicinal properties. "Cascarilla-bark" is obtained from *Croton elateria;* "croton-oil" from the seeds of *C. tiglium;* "castor-oil" from the seeds of *Ricinus communis.* Certain farinaceous roots yield "cassava-flour," "tapioca" or "Brazilian arrow-root"; and "caoutchouc" is obtained from *Siphonia elastica.* Many species of *Acalypha, Croton,* etc., are used as ornamental plants; and the garden "Poinsettia" is a species of *Euphorbia.*

EUPHRASY, the popular name of *Euphrasia,* a genus of plants of the family *Scrophulariaceæ,* or "figworts." The common species, *E. officinalis,* or "eyebright," is a low plant, with dense spikes of small flowers, and once was used in diseases of the eye.

EUPHROSYNE, a Greek goddess. See GRACES, Vol. XI, p. 26.

EURASIANS, a name applied to the offspring of European parents on the one side, and Asiatics on the other side, and chiefly used in India of the children whose fathers are Europeans and whose mothers are Hindus, and their descendants. The name is restricted properly to East India, where persons of this class are especially numerous. The girls are sometimes very beautiful, and often marry British officers, while the young men enter the government offices, or serve as clerks with merchants. They are not held in high esteem by the Europeans, who call them "Vepery Brahmins." The natives call them "Cheechee." The term *Eurasian* is also used, in geography, for facts true of Europe and Asia (Eurasia) taken as one continent.

EUREKA, a city and the capital of Humboldt County, northwestern California, on Humboldt Bay, two miles from the ocean, on the Eel River and Eureka railroad. It has a good harbor, and is a shipping-point for redwood lumber. It has 26 lumber-mills. Population in 1896, 10,000.

EUREKA, a village in Olio township, Woodford County, north-central Illinois, 19 miles E. of Peoria, on the Chicago, Peoria, and St. Louis railroad. It contains Eureka College, with which are connected a normal school and a Biblical school under the direction of the Disciples of Christ. The place has good schools, and manufactures pressed brick and tiles. Population, 1890, 1,481.

EUREKA, a city and the capital of Greenwood County, southeastern Kansas, on the Fall River, and on the Atchison, Topeka and Santa Fé and Missouri Pacific railroads. Grain, live-stock and general produce are shipped from here. Population 1895, 2,138.

EUREKA, a town and the capital of Eureka County, central Nevada, midway between Salt Lake City and San Francisco; a terminus of the Eureka and Palisade railroad. Mining is the chief business, and large quantities of lead and silver ore are produced. This place is third in importance in the state. Population, 1,609.

EUREKA, a mining town of Juab County, central Utah, in the East Tintic valley, on the Union Pacific railroad. It is situated in a cañon of Oquirrh Mountains, among a group of valuable silver-mines. Population 1894, 1,908.

EUREKA SPRINGS, a city and the capital of Carroll County, northwestern Arkansas, situated in the White River Mountains, on the White River, and a terminus of Eureka Springs railroad. Its medicinal springs attract thousands of health-seekers. Population, 3,706.

EURHIPIDURA, a group of birds, including those having a small number of tail vertebræ, a number of the last vertebræ fused to form the pygostyle, and the tail feathers arranged in a fan-fashion. All existing birds are included. The group is opposed to the fossil birds (*Saururæ*). These possessed a long vertebrated tail, with a pair of feathers attached to each vertebra.

EURIC, a Visigothic king, born about 420. He is said to have gained the throne by assassinating his brother Theodoric. He consolidated the West Gothic empire in Gaul, and continued the work of conquest which his brother had begun in Spain, by defeating the Suevi and bidding defiance to the waning Roman power. He aspired to be a legislator as well as successful warrior, and was the first king to give the West Goths written laws. He died at Arles about 485.

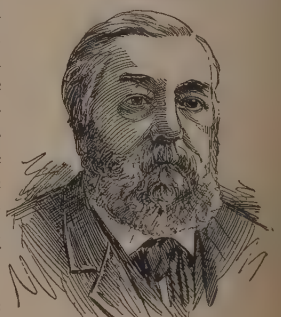
EURIPTERIDA. See CRUSTACEA, Vol. VI, pp. 662, 663.

EUROCLYDON, a tempestuous wind which is encountered upon the Mediterranean. The name is thought to be a corruption from *Εὐρακύλων,* the term given in the best Sinaitic, Vatican and Alexandrian manuscripts. In the Revised Version, in the account of the Apostle Paul's shipwreck (Acts xxvii, 14), the more commonly accepted reading, *Eurokylon* (Lat., *Euraquila*), is adopted. The storm probably corresponded to the modern "Levanter."

EURYDICE, in Grecian mythology, the wife of ORPHEUS; q.v., Vol. XVIII, p. 51.

EUSTACHIAN TUBE. See ANATOMY, Vol. I, p. 892.

EUSTIS, JAMES BIDDLE, an American soldier and statesman, was born in New Orleans, Aug. 27, 1834. He was given a classical education, and graduated at Harvard Law School in 1854. He practiced law in New Orleans, and at the outbreak of the war he served on the staff of the Confederate general, Magruder, being transferred subsequently to the staff of General Joseph E. Johnston, with whom he served till the close of the war. He was elected a member of the state legislature before the Reconstruction acts, and was one of the committee sent to confer with President Johnson upon Louisiana



JAMES B. EUSTIS.

affairs. In 1872 he was elected a member of the state assembly, and in 1874 was put into the state senate for a term of four years, but was called to serve in the United States Senate from 1877 to 1879. After that he became professor of civil law in the University of Louisiana, and held that position when he was again elected Senator by the Democrats in 1884. His term expired in March, 1891. In March, 1893, he was appointed by President Cleveland as minister to France, and a few weeks later was made ambassador extraordinary and plenipotentiary to the same country, thus being the first American sent to France with that rank.

EUTAW, a town and the capital of Greene County, central western Alabama, 32 miles S.W. of Birmingham, on the Alabama Great Southern railroad. It has a women's college, and products of lumber, gin and flour. Population 1890, 1,115.

EUTAW SPRINGS, a small stream in the northwestern corner of Berkeley County, South Carolina, 60 miles from Charleston; the scene of a hotly contested battle, the last Revolutionary engagement in the Carolinas. The British retreated by night to Charleston, having lost 1,000 men; American loss, 554. See UNITED STATES, Vol. XXIII, p. 743.

EUTERPE, a genus of American palms, having staminate and pistillate flowers intermingled on the same spadix, the spadices springing from beneath the leaves; the spathe entire, membranaceous and deciduous. They are very elegant, with lofty, slender, smooth, faintly fringed stems and pinnate leaves, forming a graceful feathery plume, the base of the leaf-stalk sheathing far down the stem, and so forming a thick column, several feet in length at its summit. The young buds are used as cabbage.

EUTHERIA. See MAMMALIA, Vol. XV, pp. 272, 383.

EUTHYNEURA. See MOLLUSCA, Vol. XVI, p. 655.

EUTYCHIANS OR MONOPHYSITES. See EUTYCHES, Vol. VIII, p. 724; and JACOBITE CHURCH, Vol. XIII, p. 538.

EUXINE SEA. See BLACK SEA, Vol. III, pp. 795–799.

EVANGELICAL ASSOCIATION, a body of Christians in the United States, commonly, though erroneously, known as German Methodists, and sometimes as Albrights. It was founded by Jacob Albright or Albrecht (1759–1808), a native of Pottstown, Pennsylvania, a tile-burner who, dissatisfied with the lax morality of the neighboring German churches, began to preach in 1790, and in 1800 established a church, and was elected pastor or bishop of the various stations where he had made converts. The name *Evangelical* was adopted, and in 1816 the first annual conference was held. They accept the Bible as their only rule of faith, interpret it according to the teachings of Arminius, but deny the doctrine of original sin. Their church polity is similar to that of the Methodists, including itinerant preachers. They were from the beginning unalterably opposed to slavery, and forbade the use of liquor as a beverage, dealers in liquor being excluded from all church fellowship. Annual conferences are held, and delegates from these meet every fourth year in general conference, which is the highest ecclesiastical court in the denomination. The presiding elders and bishops are elected for a term of four years, but may be re-elected, their authority ceasing unless so re-elected. In January, 1891, there were 26 conferences, 2,062 churches, 1,227 itinerant preachers, 619 local pastors and a total membership of 150,234. In 1890 a serious dispute arose, which resulted in a disruption of the body and the formation of a separate organization, under the name of United Evangelical Church. The cause of the trouble was an unfavorable report by Bishop Escher in regard to the superintendent of the mission in Japan. This resulted in a quarrel, during which formal charges were brought against Bishops Bowman and Escher, who secured trial by a court of three elders, and were by them exonerated. Their opponents, not satisfied, secured a second, fuller trial, and Bishop Bowman was declared suspended by a court sitting in Chicago, March 7, 1890, and Bishop Escher was similarly sentenced by a court at Reading, Pennsylvania, March 21st. The bishops, however, claiming that their case was closed at the first trial, refused to acknowledge the finding of the later courts, and continued to exercise episcopal authority. In this they were sustained by the majority and by the general conference which met at Indianapolis in 1891. The same general conference also declared Bishop Rudolph Dubs, who had opposed the other bishops in the Japan mission matter, deposed from his office and expelled from the church. The minority, which upheld Bishop Dubs, met in general conference in October at Philadelphia, and declared Bishops Bowman and Escher deposed and expelled. The general conference was split. Difficulties soon arose over the ownership of church property, which culminated in an appeal to the civil courts in the case of Immanuel Church at Reading, Pennsylvania, claimed by both factions. The supreme court of the state finally decided in favor of the majority, declaring the general conference at Indianapolis to be the only regular successor of former conferences, and the minority to be in rebellion. The minority met in general conference at Naperville, Illinois, in November, 1894, six conferences being represented, and completed their organization as the UNITED EVANGELICAL CHURCH.

The Evangelical Association publishes six periodicals, three in German and three in English, issued from the publishing house of the denomination at Cleveland, Ohio. The educational institutions include Union Seminary at New Berlin, Pennsylvania; a seminary at Blairstown, Iowa; and Northwestern College at Naperville, Illinois, which in 1895 had 15 instructors, 335 students and a library of 3,200 volumes. The foreign missions supported by the denomination included, in 1895, 84 stations, 119 missionaries and 11,829 members. The home missions included 497 stations, with 39,609 members. In connection with

the church is a Young People's Alliance, which in 1895 had a membership of 28,743, represented in 19 conference branches. See Vol. VIII, p. 725.

EVANGELICAL CHURCH CONFERENCE, one of the periodical meetings of the Protestant state churches of Germany. The idea originated with King William of Wurtemberg in 1815, but the first conference was not held till 1846. It had representatives from almost every German state. At the second conference, held in 1852, at Eisenach, where they have been held every two years since, an official organ was established, which is issued at Stuttgart. See UNITED EVANGELICAL CHURCH, in these Supplements.

EVANGELICAL COUNSELS, same as counsels to perfection in the Roman Church.

EVANS, ARTHUR JOHN, English traveler and archæologist; born at Nash Mills, Herts, in 1851, received his education at Harrow School and Brasenose College, Oxford, and pursued historical studies at Göttingen. With Professor Balfour, he explored the Finnish and Lapp countries between the Arctic and the Baltic. In 1875–82 he traveled through the Slavonic parts of southeastern Europe, exploring the antiquities and studying the ethnology and language. He also followed the revolutionary movement then going on, and described the course of events from the camps of the insurgents. Some criticism of the action of the Austrian government in south Dalmatia in 1882 resulted in his arrest and expulsion from Austrian dominions. On his return to England he settled at Oxford, where he was chosen lecturer in 1883, and in 1884 keeper of the Ashmolean Museum. He wrote *Antiquarian Researches in Illyricum*; *The Horsemen of Tarentum* (1889), a monograph on the coinage of that city; *Syracusan Medallions and Their Engravers* (1892).

EVANS, AUGUSTA JANE. See WILSON, MRS. A., in these Supplements.

EVANS, FREDERIC WILLIAM, an English lecturer and writer; born in Leominster, England, June 9, 1808, and removed to the United States in 1820. He adopted communistic principles, and in 1830 joined the Shakers at Mount Lebanon, N. Y. Of this community he became presiding elder, and for many years was its head. His teachings added new dogmas, and considerably modified the original doctrines of the Shakers. He wrote *Compendium of Principles, Rules, Doctrines, and Government of Shakers* (1859); *Shaker Communism* (1871); *Religious Communism* (1872); *Second Appearing of Christ* (1873). Died at Mt. Lebanon, March 6, 1893.

EVANS, LLEWELYN IOAN, a Welsh Presbyterian minister; born at Treuddyn, near Mold, June 27, 1833; educated at Bala, north Wales, and, after his removal to the United States, at Racine College, Wisconsin, and Lane Theological Seminary, Cincinnati. In 1856–57 he was a member of the Wisconsin legislature, and in 1860 pastor of the Seminary Church at Cincinnati. From 1860 to 1892 he held various professorships in Lane Theological Seminary. In 1892 he returned to Wales as head of the college at Bala. He published many sermons, pamphlets, and articles, and in 1874 translated into English Zöckler's *Commentary on Job*. Died at Bala, Wales, July 25, 1892.

EVANS, OLIVER, an American inventor; born in Newport, Delaware, in 1755. He is said to have invented, in 1804, the first steam road-carriage ever worked in America. He made a number of improvements in mill machinery, which effected a revolution in the making of flour. The merit of the invention of the high-pressure steam-engine, it is claimed, really belongs to Evans, to whose drawings and specifications Vivian and Trevithick are said to have had access. He wrote *Miller and Millwright's Guide* (1797); *The Young Engineer's Guide* (1805). Died in New York city, April 21, 1819.

EVANS, ROBLEY DUNGLISON, naval officer, born in Floyd Co., Va., Aug. 18, 1846. On Sept. 20, 1860, he was appointed from Utah to the Naval Academy, where he remained till 1863. On Oct. 1, 1863, he was made ensign, and in the following year was assigned to the steam-sloop *Powhatan*, of the West India squadron. In 1864–65 he was attached to the North Atlantic blockading squadron, and he took part in the attacks on Fort Fisher, N. C., Jan. 13 and 15, 1865, in the latter of which he received two severe bullet wounds. He served subsequently on the *Shenandoah*, *Congress*, and *Saratoga*, and was commissioned as lieutenant July 25, 1866, as lieutenant-commander March 12, 1868, and as commander in July, 1878. In 1891 he was assigned to the *Yorktown*, and was with that vessel at Valparaiso, Chile, 1891–92, during the pendency of the diplomatic dispute with that country arising out of the street fight which resulted in the killing of two sailors from the U. S. S. *Baltimore*, and the wounding of several others. It was from an encounter with torpedo boats anchored in Valparaiso harbor, at this time, that Commander Evans obtained his sobriquet of "Fighting Bob." On June 27, 1893, he was made captain, and in 1895 was put in command of the first-class battleship *Indiana*. In 1897 he was on duty with the Lighthouse Board. During the war with Spain (April–August, 1898) he was in command of the first-class battleship *Iowa*, and did excellent service during the bombardment of the forts at San Juan, Puerto Rico (May 12), and at the naval battle off Santiago de Cuba (July 3). when the Spanish fleet under Admiral Cervera was destroyed. At present (1899) he is again engaged in duties connected with the Lighthouse Board.

EVANSTON, a city of Cook County, Illinois, a suburb of Chicago, 12 miles N. of the City Hall. It has a city hall, water-works, and numerous churches, is the seat of the Northwestern University (*post*, p. 2224), the Garrett Biblical Institute, and a flourishing college for young women. Pop 1890, 12,762.

EVANSTON, capital of Uinta Co., Wyo. Coal and iron are found in the vicinity; coke-burning, lumbering, and stock-raising comprise the industries; and the railroad machine-shops employ a large number of men. Population 1890, 1,995.

EVANSVILLE, a city, capital of Vanderburg Co., Ind. (see EVANSVILLE, Vol. VIII); has ten railway and eight steamboat lines; is built over two veins of soft coal, and within a radius of 30 miles 60 coal shafts are in operation. Has separate high schools for negroes and whites. There is a fine public library and art gallery. There were, in 1891, 480

manufacturing establishments, employing, on an average, 7,435 hands, and producing annually nearly $13,000,000 worth of manufactured articles. The hardwood lumber trade is enormous, and is said to be the largest in the country, amounting annually to $1,600,000. The production of flour reaches 630,000 barrels annually, and 15,000,000 brick are yearly manufactured within the city limits. Evansville has grown rapidly during the last decade. Population 1880, 29,280; 1890, 50,756.

EVANSVILLE, a village of Rock County, southeastern Wisconsin, on the Chicago and North-Western railroad, 21 miles S. E. of Madison. It contains a seminary, a steam cabinet-factory and a machine-shop, an iron foundry, a wind-mill factory, and two large tobacco warehouses. Population 1895, 1,716.

EVART, a lumbering town of Osceola County, northwestern Michigan, on the Muskegon River, and on the Flint and Pere Marquette railroad, 64 miles N.N.E. of Grand Rapids. It has good water-power, saw and shingle mills, a machine-shop and a foundry. Population 1895, 1,317.

EVARTS, Jeremiah, an American philanthropist; born at Sunderland, Vermont, Feb. 3, 1781. He graduated at Yale, and, after teaching for a time, studied law and was admitted to the bar. From 1806 to 1810 he practiced law in New Haven, Connecticut; was editor of the *Panoplist* from 1810 to 1820, at the latter date becoming editor of the *Missionary Herald;* and in 1812 he became treasurer of the American Board of Commissions for Foreign Missions. In 1821 he was chosen corresponding secretary of the board, and retained the position until his death. He published several essays, including many on the rights of the Indians, under the signature of "William Penn." While traveling for his health, he died at Charleston, South Carolina, May 10, 1831.

EVARTS, William Maxwell, an American lawyer and statesman; born at Boston, Massachusetts, Feb. 6, 1818. He graduated at Yale, where he was one of the founders of the *Yale Literary Magazine;* studied in the Harvard Law School, and was admitted to the bar in New York in 1840; was chairman of the New York delegation in the national Republican convention of 1860; was Attorney-General of the United States from July 15, 1868, to March 3, 1869; received the degree of LL.D. from Union College in 1857; from Yale in 1865, and from Harvard in 1870, was counsel for President Johnson on his trial upon his impeachment in 1868; was counsel for the United States before the tribunal of arbitration on the *Alabama* claims, at Geneva, Switzerland, in 1872; was counsel for Rev. Henry Ward Beecher in the famous trial which took place in 1874; was counsel for President Hayes, in behalf of the Republican party, before the Electoral Commission; was Secretary of State of the United States from 1877 to 1881; was elected to the United States Senate from New York, and took his seat March 4, 1885. His term of service expired March 3, 1891, when he was succeeded by David B. Hill. Although an accomplished and able speaker, Mr. Evarts has published only a few occasional discourses and addresses, among them a eulogy on Chief Justice Chase, centennial oration at Philadelphia, and addresses at the unveiling of the statues of Webster and Seward, and the Bartholdi Statue of Liberty.

WILLIAM M. EVARTS.

EVE, Paul Fitzsimons, an American physician; born near Augusta, Georgia, June 27, 1806. He graduated at the medical department of the University of Pennsylvania in 1828; studied in London and Paris; served as an ambulance surgeon during the revolution of 1830, and as a regimental surgeon in the Polish War. In 1831 he returned to the United States, and in 1832 became professor of surgery in the Medical College of Georgia. In 1849 he was elected surgical professor in the University of Louisville; in 1850 in the University of Nashville; in 1868 in the University of Missouri, and later returned to Nashville as professor of operative and clinical surgery. In 1870 he became professor of the principles of surgery in the medical college at Nashville, and in 1876 took a prominent part in the International Medical Congress at Philadelphia. During the Civil War he served with the Confederate army in Mississippi and Georgia. He published several works on surgery, besides contributing extensively to various medical journals. He died at Nashville, Tennessee, Nov. 3, 1877.

EVECTION Lunar. See Astronomy, Vol. II, pp. 750, 799.

EVELYN COLLEGE, a non-sectarian institution for young women, established at Princeton, New Jersey, in 1887, and authorized to confer degrees in 1889. The board of trustees consists principally of professors and trustees of Princeton College and Theological Seminary. The classes are mainly in charge of the professors in Princeton, and any course given in Princeton is available for the students in Evelyn, who also have all necessary use of the Princeton libraries and museums.

EVENER SYSTEM. See Railroads, in these Supplements.

EVEREST, Harvey W., an American preacher and educator; born at North Hudson, New York, May 10, 1831; educated at Geauga Seminary, Ohio, the Western Reserve Eclectic Institute, Bethany College and Oberlin. After successively filling the positions of president of Eureka College, professor in Kentucky University, president of Butler University, and chancellor of Garfield University at Wichita, Kansas, he became pastor of the Christian Church at Hutchinson, Kansas. He wrote *The Divine Demonstration: A Text-Book of Christian Evidence.*

EVEREST, Mount. See Himalaya, Vol. XI, p. 825.

EVERETT, a city of Massachusetts, located in Middlesex County, in the extreme eastern portion of the state. It adjoins Boston, with which it is connected by the Eastern railroad. It is supplied with water from the Mystic Water Works of Boston. Prior to 1870 it formed a part of Malden. It has an excellent system of public schools, a good school library, a large chemical works, manufactories of rope, baby carriages, wheels, etc. Population 1890, 11,068; 1895, 18,578.

EVERETT, a borough of Bedford County, southern Pennsylvania, 9 miles E. of Bedford, on the Huntingdon and Broad Top Mountain railroad. It has an iron furnace, glass-works, two tanneries, flouring and planing mills. Population 1890, 1,679.

EVERETT, Charles Carroll, an American philosopher; born at Brunswick, Maine, June 19, 1829. He was educated at Bowdoin College, Harvard Divinity School and the University of Berlin. After holding the position of librarian, tutor, and professor of modern languages at Bowdoin, he took charge of a Unitarian church in Bangor, Maine, and in 1869 became professor of theology at Harvard; in 1878 he was chosen dean of the Divinity School. His philosophy is deeply tinged with that of Hegel. He published *The Science of Thought* (1869); *Ethics for Young People* (1891); *The Gospel of St. Paul* (1892).

EVERETT, Joseph David, a British physicist; born at Rushmere, near Ipswich, Sept. 11, 1831. He was educated at the University of Glasgow, and in 1867 became professor of natural philosophy in Queen's College, Belfast. As secretary to various scientific associations, he contributed papers on *Underground Temperature* and on *Atmospheric Electricity*. He was the author of an *Elementary Text-Book of Physics* (1877), and the inventor of a system of short-hand which has attracted wide attention.

EVERETT, Robert W., an American public man and Confederate soldier, born near Hayneville, Georgia, March 3, 1839. He was educated at Mercer University, Georgia, graduating in 1859, and became a teacher. He entered the confederate army as a sergeant under Gen. N. B. Forrest, and was in service till the close of the war. He served two years as a commissioner of revenues and twelve years as a member of the board of education, being its chairman four years. He was elected a member of the state house of representatives in 1882, and served four years, being chairman of the committee on agriculture in 1884 and 1885. In 1890 he was elected a Representative from the seventh Congressional district of Georgia to the Fifty-second Congress.

EVERETT, William, an American author and teacher, a son of Edward Everett, the orator; born at Watertown, Massachusetts, Oct. 10, 1839; educated at Harvard and at Trinity College, Cambridge, England. He was assistant professor of Latin at Harvard from 1873 to 1877, and in 1878 became master of Adams Academy, Quincy, Massachusetts. He took great interest in politics, and in 1893 was elected to Congress. He published *On the Cam* (lectures, 1865); *Changing Base* (1868); *Hesione* (poem, 1869); *Double Play* (1870), and *School Sermons* (1881).

EVERGLADES. See Florida, Vol. IX, p. 338.

EVERGREEN, a town and the capital of Conecuh County, central southern Alabama, on the Louisville and Nashville railroad, 80 miles S.W. of Montgomery. It is a well-watered region, and one where truck-farming is extensively carried on. It also has medicinal springs, and is visited by many tourists as a place of winter resort. Permanent population in 1896, 2,000.

EVERGREENS. See Arboriculture, Vol. II, pp. 315, 319.

EVERLASTING FLOWERS. See Immortelle, Vol. XII, p. 716.

EVERSLEY, a village of northeast Hampshire, southern England, 13 miles N.E. of Basingstoke. Charles Kingsley was rector of the parish from 1842 until his death, in January, 1875, and is buried in the churchyard.

EVICTION, in the sense in which it is used generally, is the act of depriving a person of the possession of land. Technically, the term denotes only the act of dispossessing another under process of law, and an expulsion without legal process is an ouster. An eviction may be total or partial. Constructive eviction may arise from acts of a landlord tending to diminish the tenant's enjoyment of the premises, as by preventing an undertenant from paying rent, or in any other manner interfering with the tenant's quiet enjoyment of the premises. Constructive eviction will not excuse the tenant from paying rent while he continues in possession, but gives him the right to abandon the premises and treat his lease as at an end. See Ireland, Vol. XIII, p. 228; also Rent, Vol. XX, p. 403, and Home Rule in these Supplements.

EVIDENCES OF CHRISTIANITY. In America it is usual to consider apologetics and the evidences of Christianity as two distinct but closely related subjects.

Apologetics is a discussion of the presuppositions on which the evidences of Christianity must rest. Is there a God? If so, is he a person? Is it to be expected that a personal God will reveal himself to man in some special way? Does man need such a revelation? By what evidences could it be attested, if given? Are miracles possible? Can any evidence prove the miraculous? Such are some of the chief questions discussed by writers on apologetics.

The evidences of Christianity are, then, presented in the light of this discussion.

The field of apologetics and Christian evidences was cultivated but little for twelve hundred years after Constantine, who made Christianity the religion of the Roman Empire, defended it with the sword, and thus relieved its professors from the necessity of providing a literary defense for it. Not until the Protestant revolt from the papacy, and the general establishment of freedom of opinion, do we find the writ-

ings of opponents stirring up the advocates of Christianity to answer objections and confute gainsayers. But since that time Christian scholars have been busy, now against deism, now against pantheism, now against materialism, now against agnosticism, and now against an unbelieving literary criticism. The discussion has proved of great value, bringing out a thousand new truths, diminishing the forces of argument available for skepticism, greatly enlarging the forces of argument available for the defense of Christianity, strengthening Christians, and leading them to a more intelligent, and hence a more victorious, faith.

Both apologetics and the evidences of Christianity have assumed many different phases in order to meet these various kinds of assault. In the first three centuries the apologists were much concerned with the slanderous accusations of Jewish and pagan opponents, and hence gave much emphasis to the innocent and beneficent lives of those whom they defended. They also retorted by exhibiting the wickedness of the Jews and the shameless depravity of the pagans, both well known. While the Greek and Latin apologists occupied this field jointly, the Greek went further, considered Christianity as adapted to the intellect of man, and laid down the rudiments of a philosophy of religion. Modern writers on apologetics and the evidences of Christianity have covered, in succession, every part of the field of research opened to them by the theoretical doubts of men.

Turning now to the evidences of Christianity, as distinct from apologetics, it is to be observed that these evidences are of two classes, the internal and the external.

The internal evidences consist of the Christian experience in its various phases. He who accepts the offers made by God in the Gospel verifies them for himself. He observes the work of God in his character and life. He enters into a new state, in which he perceives that his sins are forgiven, that his heart is changed from the predominant love of self to the predominant love of God and man, and that God is present with him in infinite compassion, wisdom and power, to sustain him in his struggle against sin, and to comfort him in disappointment and grief. He knows that God is moved by his prayers. He knows that the Bible is the revelation of God. He knows that Christ is the son of God. He does not need to solve all the difficulties and objections which may be presented to his mind from within and from without, for he is made certain of the great truths of Christianity by his immediate consciousness, as he is made certain that the sun shines by his immediate perception of its light.

While these evidences are internal to the Christian, they may be classed among the external for those who are not Christians, but who are sincere inquirers. Such persons should weigh carefully the testimony of Christians concerning their inner experiences. They will find that this testimony comes not alone from the fanciful, the light, the uneducated, but equally from the least emotional, the calmest, the wisest, the most judicious, the most learned. It is essentially the same in all ages, all countries and all classes. It must be explained. It cannot be explained as a product of human nature: it is peculiar to Christianity; it is supernatural.

The evidences of Christianity usually classed as external are those derived from the character of Christ, from his miracles, from prophecy, from the moral system of the New Testament, and from the achievements of Christianity. It may be said that each of these arguments is stronger to-day than at any preceding period.

The character of Christ has been studied in recent years as never before. The study has been conducted not alone by Christians, but also by the opponents of Christianity. The result is seen in the profound reverence with which unbelievers now always speak of the marvelous teacher of Galilee, and the more intelligent adoration paid to him by his followers. The argument has always impressed deeply those who have considered it; and familiar examples of the impression are found in the utterances of Napoleon and John Stuart Mill. It has acquired additional impressiveness by the fuller and clearer light in which it stands to-day.

During the first half of this century the argument from the miracles of Christ was passing through a stage of weakness. It was assailed first by unbelieving critics, who taught that the Gospels are comparatively late productions, and that their narratives of miracles are myths. It was assailed still more cogently by the theory of mechanical evolution, whose advocates pronounced miracles to be impossible. But the Gospels are now admitted by the best of even the skeptical critics to be products of the apostolic age, and hence the testimony of eye-witnesses. The theory of mechanical evolution has been examined, and rejected as both inadequate and degrading, by the great mass of cultivated persons. Christians no longer apologize for the miracles of the New Testament, but rather hold them forth as proofs of the unique revelaion of God in Christ.

The argument from prophecy also has passed through a phase of weakness. It was once pushed too far, and minute predictions and fulfillments were matched together in a mechanical manner, and with doubtful success. The prophets were made to say many things which they never intended to say. The opponents of Christianity assailed this argument by refuting many of these teasing mathematical interpretations, and by endeavoring to reduce all the predictions of the Old Testament to two elements, that is, to shrewd guesses and to the errors into which the shrewdest men will fall when they try to forecast the uncertain future. The assault has led to a profounder study of prophecy. Many unwarranted interpretations have been abandoned. And now that these mistakes of interpretation are cleared

away, the noble structure of prophecy stands out in fuller and larger proportions than ever before. The grand figure of the Messiah, in his suffering and his glory, is seen more clearly. All the chief events of his earthly career are portrayed in type and symbol and image, as well as in simple and plain language.

The argument from the perfect moral system of the New Testament has been attacked by comparing the moral precepts of Christianity with those of Mohammedanism and Buddhism. The result has been to show that the only perfect moral system known to mankind is that of the Christian Scriptures.

The argument from the achievements of Christianity has become specially cogent in recent times, because the achievements themselves are now presented to every observer on a scale of magnificence never before known. The practical utility of the churches in countries where they are most firmly established, and their abounding sacrifices to civilize and Christianize the pagan nations, compel candid observers to admit that Christians possess a zeal, a charity, a spirit of self-abnegation, which is not of this world, and must have come down from above.

The literature relating to this subject is voluminous. The book best known to American students is Fisher's *Grounds of Theistic and Christian Belief*. A very valuable book, clear, cogent and brief, is Robinson's *Christian Evidences*. See BIBLE, Vol. III, p. 556.

FRANKLIN JOHNSON.

EVIL EYE. See MAGIC, Vol. XV, p. 205.

EVOLUTE AND INVOLUTE. See MECHANICS, Vol. XV, pp. 679, 680.

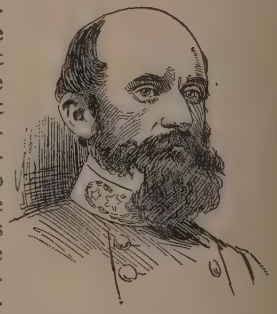
EVOLUTION, in algebra. See ALGEBRA, Vol. I, pp. 528, 529.

EVREMOND. See ST. EVREMOND, Vol. XXI, p. 168.

EWART, JAMES COSSAR, a British zoölogist; born at Penicuik, in Midlothian, Nov. 26, 1851; educated at the University of Edinburgh, where he graduated M.D., and where he was appointed demonstrator in anatomy in 1874. The following year he was elected conservator of the museums of University College, London, where he completely reorganized the museums, and carried out investigations upon the bacillus of splenic fever and of other organisms. In 1878 he was appointed by the crown to the chair of natural history in the University of Aberdeen, and in 1882 received the appointment to the same chair in the University of Edinburgh, one of the few prizes open to naturalists in Britain. At Aberdeen he organized the first classes for the practical study of zoölogy in that university, and also started a small marine laboratory. The latter was the first laboratory of the kind in Great Britain, and it was therein that Professor Ewart and the late Dr. Romanes made their study of the echinoderms, which the Royal Society constituted the Croonian lecture of 1881. At Edinburgh Professor Ewart developed the natural history department of the university, and also created an investigation department in connection with the Fishery Board, in which great progress has been made in tracing the life-history of the herring and other edible fishes. Three marine stations and a staff of qualified assistants are at the director's disposal in this work. Professor Ewart has instituted two lectureships in the University of Edinburgh, one on embryology and the other on the philosophy of natural history. He did much to obtain for the students a greatly needed union, similar to those existing at the English universities. Later he undertook an experimental investigation into the subjects of hybridity and telegony, at the Bungalow Penicuik. He obtained a Burchell zebra from the Zoölogical Gardens, Antwerp, and a jet-black Island of Rum pony from Lord Arthur Cecil. A foal from this union was born Aug. 12, 1896, which exhibited the characteristic zebra stripes (of a fawn color), on a nearly black background. The result of the experiment, when completed, will aid in settling the vexed points as to the "infection of the ovum" and also the fertility of hybrids.

EWELL, BENJAMIN STODDERT, an American educator; born in Washington, District of Columbia, June 10, 1810; was graduated from West Point in 1832, and served as professor of mathematics and philosophy there until 1836. He was afterward connected, as a professor, with Hampden-Sydney, Washington College, and William and Mary, of the latter of which he became president in 1854. He served in the Confederate army, and in 1865 was again elected president of William and Mary College, a position which he held until 1888. He was made an honorary member of the Royal Historical Society of Great Britain in 1880, and Hobart College made him LL.D. in 1874. He died at James City, Virginia, June 19, 1894.

EWELL, RICHARD STODDERT, a Confederate soldier, brother of the preceding; born in Georgetown, District of Columbia, Feb. 8, 1817. He was educated at West Point, and served in the Mexican War, and against the Apaches in New Mexico. He resigned his commission of captain to enter the Confederate army, in which he was made major-general. He lost a leg while serving under Jackson, in August, 1862, and took command of the Second Army Corps after Jackson's death, receiving the rank of lieutenant-general. He fought at Winchester, at Gettysburg, in the Wilderness, and at Spottsylvania Courthouse. Subsequently he was relieved from field duties on account of disabilities, and given command of the department of Richmond, but was defeated and captured, with his whole command, by Sheridan, April 6, 1865. He afterward settled in Springfield, Tennessee, where he died, Jan. 25, 1872.



GENERAL EWELL.

EWER, Ferdinand Cartwright, an American clergyman; born at Nantucket, Massachusetts, May 22, 1826. After graduating at Harvard he went to California, where he spent some years in journalism. In 1857 he was ordained deacon in the Protestant Episcopal Church, and a year later became priest. He labored two years in Grace Church, San Francisco, and then returned to the East, where he was appointed assistant minister in St. Ann's Church, New York City. From 1862 to 1871 he was rector of Christ Church, but, having developed ritualistic tendencies, he resigned, and his friends formed for him the new church of St. Ignatius, of which he was rector until his death. While preaching in St. John's Church, Montreal, Oct. 7, 1883, he was stricken with paralysis, and died the third day afterward. He published *Sermons on the Failure of Protestantism* (1869) and *The Operation of the Holy Spirit* (1880).

EWING, a village of Franklin County, central southern Illinois, on the Chicago, Paducah and Memphis railroad, six miles N. of Benton. It is the seat of Ewing College, and contains a large woolen factory. Population 1895, 353.

EWING, Finis, a Cumberland Presbyterian clergyman; born in Bedford County, Virginia, June 10, 1773. He settled near Nashville, Tennessee, and in 1800 was licensed to preach. Having been successful as a revivalist, in 1803 he was ordained a clergyman of the Presbyterian Church by the Cumberland presbytery. The synod of Kentucky refused to recognize his ordination, and was sustained by the Presbyterian General Assembly, whereupon, with two others, he organized the Cumberland Presbyterian Church in 1810. He preached in Todd County, Kentucky; Cooper County, Missouri; and at Lexington, Missouri, where he died July 4, 1841.

EWING, James Alfred, a Scotch engineer; born at Dundee, March 27, 1855, and educated at the high school of Dundee and at the University of Edinburgh. He took part in a number of telegraph cable expeditions, and in 1878 was appointed professor of mechanical engineering in the University of Tokyo, where he remained until 1883, when he became professor of engineering at University College, Dundee. In 1890 he was elected professor of mechanism at Cambridge. While in Japan he gave special attention to the subject of earthquakes, and devised seismographs by which a complete analysis of the motion of the ground was obtained. He gave much attention to the subject of magnetism, and was the author of an important work, *Magnetic Induction in Iron and Other Metals* (1892).

EWING, Juliana Horatia, an English writer of children's stories, daughter of Alfred Gattis, vicar of Ecclesfield, near Sheffield; born at Ecclesfield in 1842, and better known to the youthful world as "Aunt Judy." At her home in the vicarage she early began to compose nursery plays for her brothers and sisters. Her mother, moved by these nursery stories, conceived the idea of *Aunt Judy's Magazine* as a repository for them, and it was through this periodical that most of Mrs. Ewing's tales first reached the public. In 1864 she married Major Alexander Ewing, a man of literary culture. Mrs. Ewing wrote two volumes in verse concerning child and country life, but it is by her stories that she will be remembered. These treat of both high and low life, and, while at times sparkling with humor, at others they are marked by the deepest pathos. Among the best known of her tales are *Jackanapes; Daddy Darwin's Dovecote; A Flat Iron for a Farthing; We and the World: A Book for Boys;* and *Madam Liberality.* She died May 13, 1885.

EWING, Thomas, an American statesman; born in Ohio County, Virginia, Dec. 28, 1789. He was taken at an early age to the state of Ohio, and, until past the age of twenty-one, had few opportunities for an education, but by laboring in the Kanawha salt-works he earned the money to take him through the Ohio University, from which he graduated. He studied law, was admitted to the bar in 1816, and practiced with success in the courts of Ohio and in the supreme court of the United States. From 1831 to 1837 he represented Ohio in the United States Senate. In March, 1841, he became Secretary of the Treasury, but resigned a few months later, because President Tyler vetoed a bill for a national bank, of which Mr. Ewing was in part the author. In President Taylor's Cabinet he was appointed, in 1849, Secretary of the Interior, a department recently created, and organized that department, retaining his position till the death of President Taylor. When Mr. Corwin of Ohio entered the Fillmore Cabinet, Mr. Ewing took his place in the Senate by appointment of the governor of Ohio. He opposed Clay's Compromise Bill and the Fugitive Slave bill. After his retirement from the Senate in 1851, he resumed the practice of law at Lancaster, Ohio, where he died, Oct. 26, 1871.

EWING, Thomas, an American lawyer and soldier, son of the preceding; born in Lancaster, Ohio, Aug. 7, 1829; practiced law in Ohio; removed to Kansas in 1856, and in 1861 became the first chief justice of that state. He served with distinction in the Civil War, and in 1865 was brevetted major-general of volunteers. After the close of the war he settled in Washington, D.C., but in 1871 returned to Lancaster. In 1877 he was elected to Congress by his home district, served until 1881, and then removed to New York and resumed the practice of law. Died in New York, Jan. 21, 1896, from being knocked down by a cable car.

EXCELSIOR SPRINGS, a city of Clay County, northwestern Missouri, 40 miles N.E. of Kansas City, on the Chicago, Milwaukee and St. Paul and Excelsior Springs railroads. It is important as a summer and health resort. Permanent population 1890, 2,034.

EXCHEQUER, Chancellor of the. See Chancellor, Vol. V, p. 389.

EXCHEQUER TALLIES. See Tallage, Vol. XXIII, p. 29.

EXCHEQUER BILLS, bills of credit, issued

by the Commissioner of the British Treasury, to raise money for temporary purposes, to meet the needs of the Exchequer. They form a large part of the floating debt of the country. They are issued in denominations of £100, or multiples thereof, run for five years, and bear a low rate of interest. See also FINANCE, Vol. IX, pp. 182, 183.

EXCLUSION BILL, a proposed measure for excluding the Duke of York (afterward James II) from succession to the throne, on account of his avowed Roman Catholicism. A bill to this effect passed the Commons in 1679, but was thrown out by the Upper House (see ENGLAND, Vol. VIII, p. 350). As the new Parliament, summoned in 1681, seemed determined to revert to this measure, it was dissolved, and Charles II ruled thenceforth without control.

EXECUTION, the accomplishment or completion of an act or instrument. In law, it means the enforcing of the judgment of a court. It also has a technical meaning in law, and in this sense refers to a judicial writ directed to the sheriff, or other proper officer of the court, commanding him to enforce the judgment of the court. Thus an execution is issued for the arrest of the defendant, directing the sheriff to hold him in custody, to the intent that the plaintiff's debt shall be satisfied. Such executions are issued only when the debt was incurred through fraud, or the defendant refuses to deliver over his property. The common form of execution is that commanding the sheriff to levy upon sufficient of the defendant's property to satisfy the plaintiff's debt and costs. Execution, in criminal law, is the act of putting to death one convicted and under legal sentence of death. See also CAPITAL PUNISHMENT, in these Supplements.

EXECUTIVE DEPARTMENT, the branch of a national, state or municipal government, or of a corporation, which controls the administrative functions. In the government of the United States the executive power, as distinguished from the legislative and judicial, is constitutionally vested in the President, who is assisted by a Cabinet having simply advisory functions. According to the constitution, the President is *ex officio* commander-in-chief of the army and navy of the United States, and of the militia of the several states when called into the actual service of the United States. He may require the opinion, in writing, of the principal officer in each of the executive departments. He has power, by and with the advice and consent of the Senate, to make treaties, and nominates, and by and with the advice and consent of the Senate appoints, all civil, military and naval officers of the United States, when appointments are not otherwise constitutionally provided for. The duties of the Executive Department are thus the most extensive of all; for in addition to those specifically enumerated in the constitution as devolving upon the President, are all those that come under the control of the subordinate departments, whose heads, the Secretaries of State, the Treasury, the Interior, War, the Navy, Agriculture, the Postmaster-General and Attorney-General, constitute the Cabinet. Through these departments, and under the entire control of the President, the business of the government is carried on, the statutes enforced, and the special laws of Congress put into operation.

EXECUTORY, in English law, a term applied to contracts, etc., which are not executed; that is, not completed with the forms required to make them legally operative. In American law the term *executory* is used as in England.

EXEGETICAL THEOLOGY OR EXEGESIS. See HERMENEUTICS, Vol. XI, pp. 741–749; THEOLOGY, Vol. XXIII, p. 275.

EXEMPLARY DAMAGES, the damages, or more strictly speaking the compensation, which the law allows in certain cases in addition to compensation for actual damages. This class of damages is called, indiscriminately, exemplary, punitive or vindictive damages, and is allowed in actions of trespass and in all actions on the case for torts or willful injury. Exemplary damages are allowed as a punishment for willful injuries to the person or property, and also as compensation for injuries to the feelings, reputation, and other inconveniences which may not amount to actual damages. Such damages are allowed in actions for breach of promise of marriage, for slander, assault and battery, personal injury resulting from gross carelessness or a malicious motive, and other similar actions. This class of damages is based rather upon the enormity of the offense than the actual damage sustained. This class of damages is sometimes referred to as "smart-money." See DAMAGES, Vol. VI, p. 787.

EXEMPTION LAWS OF THE UNITED STATES, THE. With only four exceptions, the legislative bodies of the separate states and territories have enacted laws exempting the homestead of a resident debtor from seizure or sale for debt. In so doing, and in extending such protection to reasonable limits as regards area and value, each state or territory has acted upon the universal American principle of protecting the home, and assuring to wives and young children shelter and necessary sustenance. The system is also beneficial in extending to non-traders and small debtors the protection of a species of quasi-bankruptcy law.

In the majority of exemption statutes, carefully considered laws have so restricted the benefits of the exemptions as to prevent the protection of the statutes being enjoyed by fraudulent debtors. In a few cases the desire of a more recently settled state to secure settlers is apparent in the liberal character of its exemption laws. But this feeling soon gives way to the pursuit of a better credit.

Wisely conceived and framed as these homestead exemption laws are in the main, certain general principles pervade them all, and give similarity each to the other. As the Indian retired before the frontiersman, and the settler, with his wife and children, followed the smoke of the trapper's gun, the Federal government parceled out the lands to settlers, as described under HOMESTEAD, Vol. XII, p, 123. Then as the separate state was evolved from a territory, it was but a natural sequence that the state government should protect the gift of the Federal power, and in order to foster industry and care for

THE EXEMPTION LAWS OF THE SEPARATE STATES.

Names of States and Territories.	Real Estate.			Personal Estate.	Wages.
	Area Exempt in the Country.	Area Exempt in Cities.	Maximum Value Exempt.	Maximum Value Exempt. (a)	Wages of Head of Family Exempted.
Alabama	160 acres.	1 lot.	$2,000.	$1,000.	$25.
Alaska (See Oregon)					
Arizona	No limit.	No limit.	$4,000.	$200–$500.	1 month.
Arkansas	80–160 acres.	1 acre.	$2,500.	$500.	
California	No limit.	No limit.	$1,500–$5,000.	$200.	30 days.
Colorado	No limit.	No limit.	$2,000.	$200–$300.	$60.
Connecticut	No limit.	No limit.	$1,000.		$50.
Delaware	No homestead exemption laws.			$75–$200.	Current wages.
District of Columbia	No homestead exemption laws.			$300–$400.	$100
Florida	160 acres.	1½ acres.	No limit.	$1,000.	All wages.
Georgia	No limit.	No limit.	$1,600 in aggregate.		1 month.
Idaho	No limit.	No limit.	$1,000–$5,000.	$200.	30 days.
Illinois	No limit.	No limit.	$1,000.	$100–$400.	$50.
Indiana	No limit.	No limit.	$600.	$600.	1 month.
Indian Territory	No laws.			No laws.	
Iowa	40 acres.	½ acre.	$500.	$200.	90 days.
Kansas	160 acres.	1 acre.	No limit.	$500.	90 days.
Kentucky	No limit.	No limit.	$1,000.	$500.	$50.
Louisiana	No limit.	No limit.	$2,000.	$2,000.	Laborer's wages.
Maine	No limit.	No limit.	$500.	$150.	$20.
Maryland	No limit.	No limit.	$100.	$100.	$100.
Massachusetts	No limit.	No limit.	$800.	$300.	No limit.
Michigan	40 acres.	1 lot.	$1,500.	$250.	$25.
Minnesota	80 acres.	1 lot.		$500.	$25.
Mississippi	160 acres.	Dwelling.	$2,000–$3,000.	(a)	$20.
Missouri	160 acres.	18 sq. rods–5 acres.	$1,500–$3,000.	$300.	30 days.
Montana	160 acres.	¼ acre.	$2,500.	$600–$1,000.	30 days.
Nebraska	160 acres.	½–20 acres.	$2,000 (b)	$500.	60 days.
Nevada	No limit.	No limit.	$5,000.	$500.	$50.
New Hampshire	Residence.	Residence.	$500.		$20.
New Jersey	Residence.	Residence.	$1,000.	$50–$500.	Wages and salaries.
New Mexico	Residence.	Residence.	$1,000.	$200.	3 months.
New York	1 lot.	1 lot.	$1,000.	$250.	60 days.
North Carolina	Residence.	1 lot.	$1,000.	$500.	
North Dakota	160 acres.	2 acres.	$5,000.	$1,500.	
Ohio	Residence.		$1,000.	$500.	3 months.
Oklahoma Territory	160 acres.	1 acre.	No limit.	$600.	90 days.
Oregon	160 acres.	20 acres or 1 lot.	$1,500.	$400.	
Pennsylvania	No limit.	No limit.	$300.	$300.	
Rhode Island	No homestead exemption laws.				$10.
South Carolina	No limit.	No limit.	$1,000.	$500.	
South Dakota	160 acres.	1 acre.	$5,000.	$950.	
Tennessee	No limit.	No limit.	$1,000.	(a)	$30.
Texas	200 acres.	Lot or Lots.	$5,000.	(a)	Current wages.
Utah	No limit.	No limit.	$1,000 (c)	$500.	½ of 60 days.
Vermont	House.	House.	$500.	$250.	Current wages.
Virginia	No limit.	No limit.	$2,000.	$2,000.	$50 per month.
Washington	No limit.	No limit.	$2,000.	$500.	60 days.
West Virginia	No limit.	No limit.	$1,000.	$200.	
Wisconsin	40 acres.	¼ acre.	None.	$200–$1,500.	$180.
Wyoming	160 acres.	House and lot.	$1,500.	$500.	$100.

(a) In nearly every state a long list of specially exempted articles of personal property is included in the statute of the state, and to which reference should be had.

(b) In Nebraska and several other states, additional homestead exemption of real estate may be claimed by disabled Union veterans, when the land claimed as exempt was purchased with pension-money exclusively.

(c) In Utah an additional homestead exemption of $500 may be claimed for a wife, and $250 more for each member of the family.

California, Colorado, Kansas, Oklahoma Territory and Washington specifically exempt pension-moneys from attachment, but in so doing only enunciate a general principle of law.

its future citizens, protect the homestead as far as justice would permit. Accordingly, the homestead exemption laws are found almost invariably restricted in their benefits to bona fide residents, heads of families and dependent children. Here, too, and in a simple way, the natural justice of American legislation extirpated that relic of feudal barbarism and militarism — the custom of primogeniture. The homestead was for the widow and the children equally, not for an eldest son. The widow and children were to succeed to the estate. A thriftless father was rendered unable to sell or assign the homestead unless with the consent of his wife, or, in some cases, of his children or dependent family. A fraudulent debtor, desirous of defeating his creditors, was confined in his homestead exemption to the area of a quarter-section, and in many cases to a specified value, the excess being rendered

liable to seizure and sale. Public policy restricted as well as protected in this essentially remedial respect. The liens for unpaid purchase-money, laborers' wages, taxes and similar claims were preserved, and in nearly every state notice to creditors was required in the form of an exemption claim, to be filed as of record on the rolls of the nearest court.

Ranging, as the limit of value does, from five thousand dollars in Texas to one hundred dollars in Maryland, and varying in minor details, as each statute naturally must, the printing of the full text of all legal enactments on the subject of exemptions would tax the limits of an encyclopædia, and transgress the province of a legal text-book. A further reason against such a course presents itself in the existence of a cognate series of laws, with similar object, exempting certain specified personal property from distress, seizure or sale. Restricted, also, as these last-named legislative enactments are, in the main, to heads of families, their multitudinous specific exemptions, designed to meet each debtor's needs and conditions in life, are peculiarly the province of a legal treatise to discuss and detail. The principles alone of such legislation are proper here.

The preceding table gives a comprehensive and succinct statement of the exemptions of real and personal estate in each state or territory, but it should be remembered that a reference to the necessary statute will be required to ascertain the numerous qualifications required and the many specific articles exempted. The specific exemptions of all the states may be found collected and concisely, yet accurately, stated in the current annual volume of *Hubbell's Legal Directory*, and similar works.

EXETER, one of the capitals of Rockingham County, southeastern New Hampshire, on the Squamscott River, 50 miles N. of Boston, and on the Boston and Maine railroad. It was founded in 1638 by John Wheelwright, the Puritan preacher, who bought the site from the Indians and established there his "Church of Christ, at the Falls of Paschataqua." The well-known Phillips Academy is here, and the Robinson Female Seminary. It has a cotton-mill, railroad roundhouse and manufactures castings. Population, 4,284.

EXETER HALL, a large proprietary building on the north side of the Strand, London. It was completed in 1831, and can seat upward of 5,000 persons. It is let chiefly for religious assemblies, and is in great demand during the "May meetings" of the several religious societies. It has also been used for musical fêtes. In 1880 it was purchased, for $125,000, for the Young Men's Christian Association.

EXHAUSTIONS, METHOD OF, a mode of proving mathematical propositions regarding quantities by continually taking away parts of them. See INFINITESIMAL CALCULUS, Vol. XIII, p. 5.

EXMOOR, a wild and rugged tract of elevated moorland, broken by deep, romantic glens, or combes, sloping toward the sea, in the western part of the county of Somerset, and north and northeast portions of the county of Devon, England. Its highest point is Dunkerry Beacon, Somersetshire (1,668 feet). It is traversed by the headwaters of the Exe and Barle, and numerous smaller streams, all abounding in trout. Exmoor was a royal forest from early days, and embraced a wide area, which has now been brought under cultivation. There are some iron-mines, as well as worked-out silver-mines. From one of the latter, at Coombmartin, one Bullmer presented a massive silver cup to Queen Elizabeth. Exmoor is one of the few remaining haunts of the wild red deer, and the hunting-ground of the Exmoor staghounds, one of the oldest English packs. Transferred as its wild beauty has been to the canvas of many an artist, its fame securely rests in Blackmore's fine prose epic of the western moorlands, *Lorna Doone*. The resort of the tourist of to-day glows in the enthusiastic word-picture of him who first chronicled the deeds of "girt Jan Ridd," and the vile doings of "those flowers of the flock of villany, the Doones of Badgery." A sturdy breed of stocky ponies runs wild on the moor. The coast scenery, especially at Lynton and Lynmouth, is grand, rugged and much frequented by summer tourists. A narrow-gauge railroad was completed, in 1896, from Barnstaple to Lynton, traversing the skirts of the moor.

EXODUS. See EGYPT, Vol. VII, pp. 735, 740, 741.

EXODUS, BOOK OF. See PENTATEUCH, Vol. XVIII, pp. 505 et seq.

EXOGAMY. See TOTEMISM, Vol. XXIII, p. 472.

EXOGENS, a term formerly applied to dicotyledons, to express the fact that the stems increase in thickness by adding new layers of material to the outside, thus making growth-rings. In this application the term has been abandoned, and that of "exogenous" is applied now to those parts or organs which arise from the superficial as well as the deeper-seated tissues of the structure upon which they are borne. Stem branches and leaves are good examples of exogenous organs. See BOTANY, Vol. IV, pp. 100–103.

EXOPHTHALMIC GOITRE. See GOITRE, Vol. X, p. 640.

EXOSMOSE OR ENDOSMOSE. See OSMOSE, in these Supplements.

EXOSTOSIS. See PATHOLOGY, Vol. XVIII, p. 371.

EXOTIC PLANTS OR EXOTICS, cultivated plants originally derived from foreign countries. The term is generally applied to those whose native country differs so much in soil or climate from that into which they have been conveyed, that their cultivation is attended with difficulty, requiring artificial heat, or other means unlike those requisite in the case of indigenous plants. Some exotics seldom flower in their new home, and of those that do some never ripen their fruit and seeds.

EXPANSION, THEORY OF. See HEAT, Vol. XI, pp. 581–583.

EXPATRIATION, the act of a person in voluntarily relinquishing his citizenship in his own coun-

try and becoming a citizen, by naturalization or otherwise, of another country. The right to abandon one's country and claim citizenship in another has been seriously disputed, but, so far as the United States is concerned, the question was settled by an act of Congress in 1868, declaring this right to be inherent in all people, and denying the right claimed by foreign nations to consider naturalized Americans as citizens of the state from which they came. Since the passage of this act, treaties have been made with most European states recognizing the right of expatriation, but in some cases subject to qualifications. See ALLEGIANCE, Vol. I, p. 581.

EXPECTATION. See PROBABILITY, Vol. XIX, p. 775.

EXPLOSIVES. See GUNPOWDERS, Vol. III, p. 1494.

EXPOSITIONS. See EXHIBITIONS, Vol. VIII, pp. 803–805. See also WORLD'S FAIRS, in these Supplements.

EXPONENT AND EXPONENTIAL. When wanting to express the multiplication of unity for any number of successive times by the same number or quantity, e.g., $1x5x5$ or $1xaxaxa$, it was found more convenient to write $1x5^2$, $1xa^3$, or simply 5^2 and a^3, and the numbers 2 and 3, indicating how often the operation of multiplication is repeated, were called exponents. But the theory of exponents gradually received extensions not originally contemplated, and has now an extensive notation of its own. Thus $a^0 = 1$, $a^1 = a$, $a^{-2} = 1 \div a^2$, $a^{\frac{1}{2}} = \sqrt{a}$, $a^{\frac{1}{3}} = \sqrt[3]{a}$, $a^{\frac{2}{3}} = \sqrt[3]{a^2}$, or the cube root of the square of a. Also, A^x is the Xth power of A, X being any number, integral or fractional; and, A continuing the same, X may be so chosen that A^x shall be equal to any given number. In this case, X is called the logarithm of the number represented by A^x. Considered by itself, A^x is an exponential. Generally, any quantity representing a power whose exponent is variable is an exponential, as A^x, H^x, Y^x, etc. Exponential equations are those which involve exponentials, such as $A^x = b$, $H^x = c$.

EX POST FACTO LAW, any criminal or penal statute rendering an act punishable in a manner in which it was not punishable when it was committed. Any law which would make an act criminal which was not criminal when done, or which would increase the severity of the punishment of a previous act, or which would alter the rules of evidence or procedure so as to put one accused of a crime committed previous to the law in a worse position before the courts, is prohibited by the constitution of the United States.

EXPRESS, a system for the fast conveyance of goods, merchandise and parcels. The express business in the United States had its beginning in the custom of intrusting to stage-coach drivers, railroad conductors, etc., parcels for delivery; but it was not until William F. Harnden of Boston contracted with the Boston and Worcester railroad for the transmission of packages that anything like a system was introduced into the carrying business. The project recommending itself to business men, competing companies sprang up rapidly, and express lines were established in all directions. Besides delivering goods, express companies undertake to collect, on account of merchants, the price of goods sold and forwarded by express; this process is known as the system of C.O.D., or "collect on delivery." The companies also have a system of money-orders payable at any of their offices throughout the country, and received, like checks, by large banks, when handed in by depositors. The most profitable branch of the business is the collection of notes, and care and transportation of deeds, bullion and valuables of all kinds. The United States government contracts with one of these companies for the conveyance and delivery of all public moneys and securities. Before the law an express company is a "common carrier," with the same liabilities as any other common carrier, notwithstanding any declaration on its bills of lading that it is not to be so considered. The leading express companies in the United States are the Adams Express Company, American Express Company, United States Express Company and Wells, Fargo and Company. In continental Europe the carrying service is performed by the post-office; in the United Kingdom, mainly by the railways themselves, although the parcels post is also well established. Experiments made in the United States on the part of railroads, in the work of collection and delivery, have not proved successful.

EXTENSITY OF SENSATION. See PSYCHOLOGY, Vol. XX, p. 53.

EXTENT, in English law, a writ issuing out of the court of exchequer to compel payment of debts to the crown. See WRIT, Vol. XXIV, p. 696.

EXTERRITORIALITY signifies the immunity to which foreigners are entitled who, being in another state, are not amenable to its laws. Ambassadors, ministers from a foreign state, consuls and other officers of foreign states, whose duties require them to be located in the state to which they are sent as representatives, are included in this class.

EXTORTION is the act of an officer, or one acting under color of official authority, in unlawfully taking money or something of value from another for the purpose of procuring such officer to perform a duty. The act of requiring unlawful and exorbitant fees for services is extortion. The word is sometimes used in a broader sense, meaning any oppression or act under color of right, whereby one requires another to pay money or surrender property to procure the performance of a duty or prevent the perpetration of an injury. Under some circumstances the offense is punishable as a misdemeanor.

EXTRADITION. The right to demand of a foreign state the return of a fugitive from justice, who has taken refuge in such state, has not fully been determined in international law. It is probable that the necessity of determining whether this right exists as an inherent right of a state will not arise soon, for the reason that most enlightened nations now have extradition treaties with the principal states of the world, whereby it is agreed, under certain limitations, that fugitives from justice in another state shall be returned to the state from which they have fled. It has been decided in the United States and in England, that, in the absence of treaties,

it is not the duty of one state to turn over a fugitive criminal to the state from which he has fled. Before the extradition treaty with Spain, the President of the United States honored the requisition of that government asking the return of Arguelles, because of the atrocity of the crime charged against him. The Senate interposed a resolution inquiring under what law or what treaty this action was taken. The President responded that for the sake of justice he had honored the requisition upon the ground of the comity of nations, but made no claim that the United States could be required to do so. Congress has established laws providing for the execution of agreements made by treaty for the return of fugitives from justice, which would, perhaps, by implication, exclude the right to make such return when no treaty is in existence. Both the United States and Great Britain, however, frequently have obtained the return of fugitive criminals from states with which no treaty existed. France and most of the other states adhere to the doctrine, that, under the comity of nations, fugitives from justice, who have taken refuge in a foreign state, should be delivered over to the state from which they have fled, regardless of whether an extradition treaty was in force.

In 1842 an extradition treaty was entered into between the United States and Great Britain, but only seven crimes were named which were sufficient to warrant extradition of fugitives. This treaty was changed in 1889, and increased the number of extraditable offenses to 27. The condition was added in the treaty concluded in 1889, also, that no person who should be surrendered under that treaty should be tried for any offense committed prior to the time of his surrender except the extradition offense. Most modern treaties on this subject require that *prima facie* proof of the guilt of the person accused shall be presented before his surrender can be demanded, and the mere assertion of guilt by the foreign government is not sufficient. Political offenses almost universally are excluded in modern treaties as extraditable offenses, for the reason that the political conditions of the different states vary so vastly that an offense of this class which may be punishable with great severity in one state may be considered trivial by most of the other nations of the world. Because of the great oppression which is sometimes brought about through the medium of laws against political offenses, most of the enlightened nations of the world refuse to surrender those accused of crimes of this class. The great difficulty, however, which arises on account of this exception, is to make a proper distinction between political offenses and those which are not of a political nature. Frequently, crimes, essentially political, are accompanied by acts of violence, which are the result of malice, rather than opposition to political conditions. No accepted definition of the term *political crime*, as used in extradition treaties, has been formulated, and the most the courts of the United States have done is to decide whether particular cases come within the meaning of that term. Since the assassination of President Garfield, provisions have been inserted in the treaties between the United States and several foreign powers, to the effect that an attempt against the head of a government or a member of his family, when such attempt comprises the act of murder, assassination or poisoning, shall not be considered a political offense. It is the custom of the United States and Great Britain to surrender their own citizens who have escaped after having committed a crime in foreign territory. This rule is not generally followed by other nations. It is usually the practice to either undertake the punishment themselves or permit the offender to escape punishment entirely. Among the states with which the United States now has extradition treaties, are the following: Austria, Hungary, Belgium, Dominican Republic, Ecuador, France, the German Empire, Great Britain, Hawaiian Islands, Haiti, Italy, Japan, Luxemburg, Mexico, Netherlands, Nicaragua, Orange Free State, Ottoman Empire, San Salvador, Spain, Sweden and Norway, and Switzerland. Extradition, or, more strictly speaking, rendition of fugitives from justice from one state of the United States to the state in which the crime was committed, is provided for by the constitution of the United States, and is not in any manner governed by the rules of international extradition. The constitution provides that any person charged with treason, felony or other crime in one state of the United States, and who has fled from justice, and is found in another state, shall, upon demand of the executive officer of the state from which he has fled, be delivered up to be removed to the state in which the offense was committed. Under this provision, no exception is made as to any class of crimes, as is the custom in international treaties, and the general manner in which the rendition shall be made is fixed by the United States statutes. By act of Congress the executive authority of the state from which the fugitive has fled is the proper source to make demand for his return, and a copy of an indictment or an affidavit made before a magistrate of any state or territory, charging the person demanded with having committed treason, felony or other crime, duly certified by the governor or chief magistrate whence the person so charged has fled, must be presented to the executive authority of the state upon which the requisition is made. The general details as to the manner in which requisitions shall be made, and what officers shall make the arrests, and what officers shall act as agent for the executive authority of the state demanding the return, for the purpose of receiving the prisoner, are fixed by the state statutes. The state making demand for return of the criminal must pay all costs connected with the arrest and delivery of the person extradited. See EXTRADITION, Vol. VIII, p. 813.

EXUMAS, a part of the group of the Bahama Islands, comprising Great Exuma (lat. 23° 30′ N., long. 75° 50′ W.), Little Exuma and the Exuma Keys. They contain about 2,000 inhabitants, who are employed partly in agriculture, but chiefly in salt-making. In 1851 the Exumas exported 115,356 bushels of salt. Little Exuma is the second most important port of entry in the Bahamas.

EYALET, former name for a Turkish vilayet; q.v., in these Supplements.

EYAM, a village in north Derbyshire, north-central

England, five miles N. of Bakewell, with a population of 1,038, chiefly engaged in lead-mining. Here, in September, 1665, the plague then raging in London broke out in its most virulent form. William Monpesson, the rector of the parish, aided by Thomas Stanley, devoted himself to the care of the dying with the most heroic courage. The plague lingered 13 months, and 260 out of a population of 350 perished.

EYEBRIGHT, the common name of *Euphrasia*, a genus of plants of the family *Scrophulariceæ*, having a tubular calyx, the upper lip of the corolla divided, the lower of three nearly equal lobes, the cells of the anthers spurred at the base, a two-celled capsule and striated seeds. Some of the species are root-parasites. They are natives of Europe and Asia. The common eyebright (*E. officinalis*) is a little plant about six inches high, with ovate serrated leaves, and white or reddish flowers streaked with purple. It is abundant in pastures and on mountains, and has been used as a medicine in diseases of the eyes and catarrhal affections. It is a weak astringent.

EYE, Development of. See Sense-Organs, in these Supplements.

EYE, Diseases of. See Ophthalmology, Vol. XVII, pp. 780–787.

EYEPIECES. See Telescope, Vol. XXIII, pp. 143, 144.

EYLAU, Battle of, a bloody and indecisive engagement fought near the town of the same name in East Prussia, Feb. 8, 1807, between the French under Napoleon, numbering 80,000, and the allies —Russians and Prussians—under Bennigsen, with a smaller number of men, but more artillery. The struggle lasted all day, and as night closed upon the field the allies were driving Napoleon's troops before them; but as the Russians and Prussians re treated during the night, the French claimed the victory. The loss to each army is estimated to have been about 18,000.

EYMERICH or EYMERICO, Nicholas, a Spanish inquisitor; born at Gerona about 1320. He joined the Dominican order, and was appointed in 1356, by Innocent VI, inquisitor-general of Aragon, and in 1371 became chaplain and judge of heresies to Gregory XI at Avignon. He wrote *Directorium Inquisitorium* in 1376, a work which served as a guide to the infamous Torquemada a century later.

EYRE, a salt lake of South Australia, lying north of Spencer Gulf, at an altitude of 79 feet, and having an area of 3,706 square miles. Except in the rainy season, this lake is generally a mere salt marsh. It is underlaid with an inferior quality of coal. It was discovered in 1840 by Edward John Eyre.

EYRE, Edward John, an English explorer and colonial governor; born in August, 1815, in Yorkshire; went to Australia in 1833, and in 1840–41 explored the south coast of Australia and discovered Lake Torrens. He was afterward appointed lieutenant-governor of New Zealand and of the island of St. Vincent. In 1862 he became governor of Jamaica, and in 1865 suppressed, with severity, a negro insurrection. Martial law was proclaimed, and a wealthy mulatto named Gordon, who was a member of the House of Assembly, was hanged. Eyre was recalled and prosecuted by a committee, of which John Stuart Mill was a member. Such men as Carlyle, Charles Kingsley and Sir Roderick Murchison defended Eyre, and he was acquitted by a jury. After the trial he went into retirement. The English government eventually reimbursed him for the expenses, amounting to fifty thousand dollars, which he incurred in defending himself while on trial. See also Jamaica, Vol. XIII, p. 551.

EYRIA or EYRE'S PENINSULA, on the south coast of South Australia, triangular in shape, its base being formed by the Gawler Range, while its sides are washed on the southeast by Spencer Gulf, and on the southwest by the Great Australian Bight. It is a rich pastoral country.

EYTELWEIN, Johann Albert, a Prussian engineer and physicist; born at Frankfort-on-the-Main, Dec. 31, 1764; served in the artillery, where he acquired a practical knowledge of engineering. He held important civil offices, and was employed in a large number of public works. Among his writings are a *Manual of the Mechanics of Solid Bodies and Hydraulics* (1801); *A Manual of Perspective* (1810). He died at Berlin, Aug. 18, 1848.

EZEKIEL, Moses Jacob, an American sculptor; born in Richmond, Virginia, in 1844; served in the Confederate army during the war, and in 1869 entered the Royal Academy of Arts at Berlin, remaining till 1871, when he entered the studio of Albert Wolf. In 1873 he gained the Michaelbeer prize, entitling him to two years' study in Italy, where he went the following year. He took up a permanent residence in Rome, making only occasional visits to America. His most famous work, a group entitled *Religious Liberty*, is in Fairmount Park, Philadelphia. Some of his other works are *Israel; Eve; The Sailor Boy; Grace Darling*. His productions have been exhibited at Rome, Berlin, Cincinnati and the National Academy, New York, and elsewhere.

EZION-GEBER or EZION-GABER, an ancient port, situated on the modern Gulf of Akabah, the Sinus Elanites of antiquity, the easternmost of the two divisions into which the Red Sea bifurcates at its northern extremity. It is mentioned in the Scriptures as the last camping-place of the Israelites before entering the wilderness of Zin. From this place, too, Solomon sent a fleet to Ophir, and it was here that King Jehoshaphat built ships for the same destination. Some ruins in the sea, a short distance south of the village of Akabah, are supposed to be the ruins of Ezion-geber.

F

FAAM—FACTORY LEGISLATION IN THE UNITED STATES

FAAM OR FAHAM, an orchid, native of Madagascar, prized for the fragrance of its leaves, which is owing to the presence of coumarin. In Mauritius an infusion of faam leaves is in great repute as a cure for pulmonary consumption.

FABA, an old genus of *Leguminosæ*, now referred to *Vicia*, but still sometimes kept separate. *Vicia Faba* (*F. vulgaris*) is the common "horse-bean" of Europe.

FABLIAUX OR FABLEAUX, an appellation given in old French literature to a class of short, metrical narratives, intended for recitation,—the tales of the Trouvères. They were the prototypes of the modern novel. See ROMANCE, Vol. XX, p. 633.

FABRE, CHARLES EDWARD, a Canadian churchman; born at Montreal, Feb. 28, 1827; educated at the College of St. Hyacinthe and the Seminary of Issy, France, and ordained priest in 1850. He visited Belgium in 1869 and made a study of the methods of articulation in use in asylums for the deaf and dumb. He afterward turned his experience to account in the institution for deaf-mutes which he founded in Montreal. He was distinguished as a pulpit orator, and in 1876 became bishop, and in 1886 archbishop, of Montreal. Died Dec. 30, 1896.

FABRE, LOUIS K. HECTOR, a Canadian journalist, brother of preceding; born at Montreal, Aug. 9, 1834; educated at the colleges of St. Hyacinthe and St. Sulpice, and admitted to the bar in 1856. He entered upon newspaper-work, and for a time was editor of *L'Ordre* in Montreal, and of *Le Canadien* in Quebec. In 1869 he founded *L'Événement* in Quebec, becoming its editor and proprietor. He was appointed to the Dominion Senate in 1875, and in 1882 Agent at Paris for the Dominion government.

FABRICE, GEORG FRIEDRICH ALFRED VON, a Saxon soldier and statesman; born at Quesnoy-sur-Deule, France, May 23, 1818. In 1834 he entered the Saxon service, and took part in the campaign in Schleswig-Holstein in 1863 and 1864, and was chief of staff to the crown prince of Saxony in the Bohemian campaign of 1866, in which he distinguished himself. As Secretary of War, in the same year he assumed the task of reorganizing the Saxon army after the Prussian pattern. He was commander-in-chief of the army of occupation in France in 1871. At the close of the Franco-Prussian war he was made Minister of War for Saxony, and in 1876 Prime Minister and Minister of Foreign Affairs. The title of count was conferred upon him in 1884. He died in Dresden, March 25, 1891.

FABRONI, GIOVANNI VALENTINO MATHIAS, an Italian scientist; born at Florence, Feb. 13, 1752. He applied various physical sciences to objects of general interest. He constructed the bridge across the Dora Baltea, and the road across Mt. Genèvre, at an elevation of six thousand feet. He was director of the museum at Florence, and in 1815 took the chair of natural science at the University of Pisa. His writings on botany, chemistry and economy are numerous. He died at Pisa, Dec. 17, 1822.

FABULÆ ATELLANÆ. See ATELLA, Vol. II, p. 827.

FABVIER, CHARLES NICOLAS, a French soldier; born at Pont-à-Mousson, Dec. 15, 1783. He served with distinction in Germany and Spain, and was severely wounded at Moscow in 1812. In 1814 he signed the capitulation of Paris. In 1823 he went to the assistance of the Greeks, and rendered valuable service in organizing an army. He resigned from the Greek service in 1828. In 1839 he was created lieutenant-general, and in 1845 became a peer of France. His writings comprise several military and historical treatises. He died Sept. 15, 1855.

FACATATIVÁ, a town of Cundinamarca, central Colombia, 18 miles N.W. of Bogotá, and connected with it by rail. Elevation, 8,500 feet. The river Facatativá enters the earth here, and flows underground for a short distance. The town has some commercial importance, receiving much of the trade of Bogotá and transmitting it down to the Magdalena. Some interesting antiquities are found near by. Population, 7,000.

FACCIO, FRANCO, an Italian composer; born at Verona, of humble parentage, March 8, 1840 (or 1841); entered the Milan Conservatory in 1855, where he made remarkable progress in composition. He left the conservatory in 1861, and on Nov. 10, 1863, his opera, *I Profughi Fiamminghi*, was performed at La Scala. Before this, *Le Sorelle d' Italia*, written in collaboration with Boito, had been performed at the Conservatorio. *Amleto*, the libretto of which was written by Boito, was produced at Genoa in 1865. After serving in the Garibaldian army, he became professor of harmony in the Milan Conservatory, and in 1872 succeeded Terziana as conductor at La Scala. Faccio held an important position among the musicians of Italy; but it was as a conductor he was most successful, being considered the greatest Italian conductor of his day. He died July 21, 1891.

FACIAL PARALYSIS OR BELL'S PALSY. See PARALYSIS, Vol. XVIII, p. 257.

FACING AND BORING MACHINES FOR LOCOMOTIVES. See MACHINE TOOLS, in these Supplements.

FACTOR OF SAFETY. See STRENGTH OF MATERIALS, Vol. XXII, p. 596.

FACTORY LEGISLATION IN THE UNITED STATES. In almost every state in the United States laws are in force regulating the manner of conducting factories and workshops. Most of these laws require that the sanitary condition of all factories and workshops be subject to inspection by a

board of factory inspectors or other officers appointed for that purpose, and establish more or less rigid rules under which such enterprises shall be conducted. The object of this class of legislation is to protect the health of the workmen, and also to prevent the extension, among the public, of infectious diseases and vermin, through the medium of the manufactured articles. Legislation has been attempted in most of the states, with somewhat varied success, to regulate the number of hours which shall constitute a day's labor in factories and workshops, and to make it unlawful to require employees to work for a great number of hours per day. This class of legislation has been enacted most frequently with respect to the labor of women and minors, and in some states minors are not permitted to receive employment except upon complying with certain educational requirements. The substance of the present condition of the statutory factory regulations in the various states is as follows:

California. No male or female under the age of 18 years shall be employed in a factory or workshop for more than 10 hours per day, or 60 hours per week. Children under 10 shall not be so employed. Any violation is a misdemeanor, punishable by fine.

Colorado. Statutes prohibit employment of children under 14 years of age in factories and workshops.

Connecticut. Males under the age of 16, and all females, shall not be employed in factories more than 10 hours per day, or 60 hours per week. No child under 14 years of age shall be so employed. Any violation is a misdemeanor, punishable by fine.

Georgia. The statute prohibits the employment of any one under 21 years of age in a factory or workshop, or any one, without respect to age, in a cotton or woolen factory, for more than 11 hours per day, or 66 hours per week.

Illinois. No minor under the age of 14 years shall be employed in a factory or workshop. The law restricting the right of employment of females in factories to 8 hours per day has recently been declared unconstitutional.

Indiana. Minors between the ages of 14 and 18 years are restricted to 10 hours' employment per day in factories or workshops, and those under 14 years of age to 8 hours. A violation is a misdemeanor, punishable by fine.

Louisiana. Males under 18 years of age, and all females, are prohibited from working in factories or workshops for more than 10 hours per day, or 60 hours per week, out of which time they shall have 1 hour daily for dinner. Boys under 12 or girls under 14 years of age are excluded from such employment. It is a misdemeanor, punishable by fine, to violate this statute.

Maine. Males under 16 years of age, and all females, are exempted from more than 10 hours' labor per day, or 60 hours per week, in factories or workshops, but females above the age of 18 years may contract to work a greater number of hours. This class of employment is prohibited to minors under 12 years of age. Violation amounts to a misdemeanor, punishable by fine.

Maryland. The statute forbids the employment of any one under the age of 16 years in a factory or workshop for more than 10 hours per day, or 60 hours per week, and makes any violation a misdemeanor, punishable by fine.

Massachusetts. All males under 18 years of age, and all females, are prohibited from working in factories or workshops for more than 10 hours per day, or 58 hours per week, from which time they shall be allowed one half-hour for dinner, or one half-hour after any six hours' work. No one under 21 years of age may work between the hours of 10 o'clock p.m. and 6 o'clock a.m. No children under 13 years of age shall be employed at work of this class, nor under 14 years of age, unless they can read and write and have attended school for 30 weeks during the previous year. Violation of the law is a misdemeanor, punishable by fine.

Michigan. Females under 21 and males under 18 years of age are prohibited from working in a factory or workshop for more than 10 hours per day, or 60 hours per week, and shall have 1 hour daily of this time for dinner. The factory inspector may issue a permit to allow a shorter time for dinner. Those above those ages may contract to work a greater number of hours per day. No minor under the age of 14 years may be so employed. A violation is made a misdemeanor, and punishable by fine.

Minnesota. The statute prohibits work in factories or workshops by males under 18 years of age, and all females, for more than 10 hours per day, or 60 hours per week, and by females under the age of 18 years for more than 8 hours per day. But all persons above 14 years of age may contract to work a greater number of hours per day.

Nebraska. Minors under 12 years of age shall not be employed in factories or workshops for more than 5 months in a year.

New Hampshire. The statute provides that males under the age of 18 years, and all females, shall not work in factories or workshops for more than 10 hours per day, or 60 hours per week, and that no minors under 10 years of age shall be so employed. A violation is a misdemeanor, punishable by fine.

New Jersey. All under the age of 21 years are excluded from work in factories or workshops for more than 10 hours per day, or 60 hours per week, and no boy under 12 or girl under 14 years of age may be so employed. Violations are misdemeanors, punishable by fine.

New York. Males under 18 and females under 21 years of age are not permitted to work in factories or workshops for more than 10 hours per day, or 60 hours per week, and shall have 1 hour of such time for dinner. Factory inspector may issue permit to allow shorter time for dinner. Minors under the age of 14 years shall not be so employed. No male under 18 years of age, and no woman, shall work between the hours of 9 p.m. and 6 a.m. Violations are punishable by fine.

North Dakota. Males under 18, and women, are prohibited from working in factories or workshops for more than 10 hours per day, or 60 hours per week, but any one above 14 years of age may contract to work a greater number of hours per day. Boys under 12 and girls under 14 years of age are prohibited from such employment by the state constitution. Violations are misdemeanors, and punishable by fine.

Ohio. No person under 18 years of age may work in a workshop or factory for more than 10 hours per day, and no minor under 12 years of age shall be so employed.

Oklahoma. Males under 18 years of age, and females, shall not work in a factory or workshop for more than 10 hours per day, but any one over 18 years of age may contract to work a greater number of hours per day. A violation is a misdemeanor, and punishable by fine.

Pennsylvania. No one under 21 years of age may be employed in a factory or workshop for more than 12 hours per day, from which time 1 hour shall be allowed for dinner. The factory inspector may issue a permit to allow a shorter time for dinner. No one under 13 years of age shall be so employed. A violation is a misdemeanor, punishable by fine.

Rhode Island. Males under 16 years of age, and females, are limited to 10 hours' employment per day in factories or workshops, and no minors under the age of 12 years shall be so employed. Violations are misdemeanors, punishable by fine.

South Carolina. No one may work in a cotton or woolen factory for more than 11 hours per day.

South Dakota. Ten hours per day, or 60 hours per week, is the limit of employment in factories or workshops permitted to males under 18 years of age, or women, but any one over 14 years of age may contract to work a greater number of hours.

Tennessee. Minors under 12 years of age are not permitted to work in factories or workshops.

Vermont. Children under 15 years old shall not work in factories or workshops for more than 10 hours per day. Those under 10 years of age shall not be so employed.

Virginia. Males under 14 years of age, and women, are excluded from employment in factories or workshops

for more than 10 hours per day, or 60 hours per week, and a violation is punishable by fine.

West Virginia. No minors under 12 years old may work in factories or workshops.

Wisconsin. Males under 18, and women, shall not be required to work in a factory or workshop for more than 8 hours per day, but any one over 18 may contract to work overtime. No minor under 14 years of age may be so employed. Violations are punishable by fine.

The states of Arkansas, Florida, Idaho, Iowa, Kentucky, Kansas, Mississippi, Missouri, Nevada, North Carolina, Oregon, Texas, Washington and Wyoming, with Arizona and New Mexico, have no legislation of this character. In many states, children under certain specified ages, ranging from 13 to 16 years, are prohibited from working in factories unless they can read and write, and also, in many states, unless they have attended school for a certain period of the previous year. Frequently, also, children of tender years are not permitted to work in places which would tend to injure their morals, or where the work is dangerous. Legislation has been enacted in many states requiring that factory employees shall be paid weekly, and also that the payment shall be in money. These provisions have been declared unconstitutional in several states. The supreme courts of the states of Pennsylvania, Ohio, West Virginia, Missouri and Illinois have declared laws requiring payment in money to be unconstitutional and void. The supreme court of Indiana alone, thus far, has sustained a law of this character. It is likely that these laws, as well as many other laws designed to benefit factory employees, will yet be declared void in many other states, as being a limitation of the right of contract, and therefore contrary to the constitution of the state and of the United States. In Massachusetts similar laws have been held valid, on account of the peculiar provision of the constitution of that state; and in Rhode Island laws affecting corporations alone were declared valid It has thus far been difficult to devise laws that will stand all the tests to which they may be subjected, to regulate the mode of conducting factories so that full protection may be given to employees. As this class of laws is statutory and constantly being changed, it will be necessary to refer to the state statutes for detailed information concerning them, to insure accuracy. See FACTORY ACTS, Vol. VIII, pp. 844–846; and LABOR LAWS, in these Supplements.

FAED, JOHN, a Scottish painter; born at Burley Mill, near Gatehouse-of-Fleet, Kirkcudbrightshire, in 1820. His love of art was early manifested, and when hardly in his teens he made tours through the villages of Galloway, painting miniatures. In 1841 he went to Edinburgh, and in 1851 became a member of the Royal Scottish Academy. In 1861 he went to London, where his talents won recognition. In 1880 he returned to Gatehouse-of-Fleet, and his later pictures were chiefly landscapes. Among his paintings are *The Cottar's Saturday Night* (1854); *Job and His Friends* (1858); *Catherine Seyton* (1864); *John Anderson, My Jo* (1870); and *The Leisure Hour* (1878).

FAED, THOMAS, a Scottish painter, brother of John Faed, was born at Burley Mill, June 8, 1826, and in 1842 began his regular art studies in Edinburgh. At the Trustees Academy he took several prizes. In 1849 he was made an associate of the Royal Scottish Academy; in 1861, an A.R.A., in 1864 an R.A., and was elected an honorary member of the Vienna Royal Academy in 1875. Some of his well-known works, most of which deal with domestic and pathetic subjects, are *Highland Mary* (1856); *From Dawn to Sunset* (1861); *The Last of the Clan* (1865); *God's Acre* (1872); *Little Cold Tooties* (1877).

FAGGING, a usage in the great public schools of England, in virtue of which the senior boys are authorized to exact a variety of services from the junior boys. A lower-form boy has certain duties to perform to all the upper-form boys, as in stopping the balls for them when practicing cricket, and others which he owes to a special master, such as stoking his fire, and carrying his messages of a more or less private kind. Thomas Hughes's well-known *Tom Brown's Schooldays* presents a vivid, and at the same time accurate, account of this usage.

FAGNANI, JOSEPH, an Italian artist; born in Naples, Italy, Dec. 24, 1819; studied art in Naples and Vienna. In 1851 he came to the United States and settled in New York City. He painted the *Nine Muses* for the Metropolitan Museum of Art, and produced portraits of many celebrities, among them being Queen Christina of Spain, Victor Emmanuel, Eugénie, Duke of Aumale, Garibaldi, Peel, John Bright, Daniel Webster and General Sheridan. He died in New York City, May 22, 1873.

FAGOTTO AND FAGOTTINO. See OBOE, Vol. XVII, p. 707.

FAHLUN. See FALUN, Vol. IX, p. 17.

FAIDHERBE, LOUIS LÉON CÉSAR, a French soldier, statesman and archæologist; born at Lille, June 3, 1818. He studied at the École Polytechnique and at Metz, afterward serving as a military engineer in Algeria and the West Indies. Made governor of Senegal in 1854, he rendered the French dominion in Africa great service by his accurate knowledge of the country and its population. At the commencement of the war with Germany he had command of Bona, in Algeria, and when the armies were reorganized in 1870 he was appointed general of division and commander-in-chief of the North. He commanded in the battle of Pont-Noyelles, relieving Hallue from siege, and also in that of Bapaume. Although his little-practiced forces were afterward defeated by the Germans, he proved himself a very able commander. Joining the party of Gambetta, he was elected to the National Assembly in 1871. He retired from public life when the government of Thiers came into power. He was sent on a scientific expedition to Egypt, and subsequently published several works on archæological topics. He also published a book on the war, *Campagne de l'Armée du Nord.* He was grand chancellor of the Legion of Honor at the time of his death, which occurred Sept. 28, 1889.

FAIENCE, FAENZA OR FAYENCE, a general term for all sorts of glazed earthenware and porcelain. The origin of the name is disputed. Some derive it from Fayence, a small town of Provence; others from Faenza, a city of Italy; while certain

writers consider the isle of Majorca the place where it was originally manufactured, as the Italians still call faience *majolica* or *mayolina*. See POTTERY, Vol. XIX, pp. 626–28.

FAIENCE WARE, AMERICAN. See CERAMIC ART, in these Supplements.

FAILLON, MICHEL ÉTIENNE, a French priest and historian; born at Tarascon in 1799. He became a priest of the Sulpician order, and in 1854 was sent as a visitor to the Sulpician houses in Canada. He completed three volumes of an elaborate history of the French in Canada, besides writing a number of biographies. He died in Paris, Oct. 25, 1870.

FAILLY, CHARLES ACHILLE DE, a French soldier; born at Rozoy-sur-Serre, Aisne, Jan. 21, 1810; saw early service in Algeria; was brigade commander in the Crimean War; commanded a division in the war with Austria in 1859, and on the day of the battle of Solferino received the grand cross of the Legion of Honor. He was at the head of the expedition sent, in 1867, to protect the pope against Garibaldi, at which time he introduced the chassepot rifle into the French army. At the opening of the Franco-Prussian war he was placed in command of the Fifth Army Corps, but was removed from this position for failing to support MacMahon at Wörth. He was taken prisoner at Sedan, and after his release retired to Brussels, where he published a work in his vindication, entitled *Opérations et Marches du Cinquième Corps* (1871). After the Franco-Prussian war he had no public employment. He died at Compiègne, Nov. 15, 1892.

FAINÉANTS ("do-naughts"), kings of France, the last of the Merovingian dynasty. See FRANCE, Vol. IX, pp. 529–30; and GERMANY, Vol. X, p. 480.

FAINTING OR SYNCOPE. See HEART, Vol. XI, p. 554.

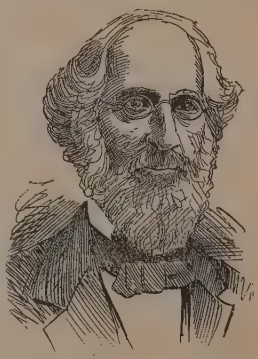
FAIRBAIRN, SIR ANDREW, a British railway magnate; born March 7, 1828, in Glasgow, Scotland. He was the son of SIR PETER (1800–61), a large manufacturer of engineering-tools, whom the Queen knighted on the occasion of her visit to Leeds in 1858, during his mayoralty; and also nephew of SIR WILLIAM, the famous engineer. The younger man was educated at Leeds, Glasgow, and Cambridge University, graduating at Peterhouse College in 1850. He was called to the bar, but in 1856 became a partner with his father; was twice mayor of Leeds (1866–68), when he was knighted; became director of the Great Northern Railway in 1878, and commissioner, the same year, to the Paris Exposition; sat in the House of Commons for a West Riding division for 12 years from 1880; vice-president of the Brussels Railway Congress in 1885, and president of first section of the International Railway Congress, in Paris, 1889, when he was made an officer of the Legion of Honor; knighted by the king of Belgium; high sheriff of Yorkshire, 1892–93.

FAIRBAIRN, ANDREW MARTIN, a Scottish theologian; born near Edinburgh, Scotland, Nov. 4, 1838; educated at the universities of that place, of Glasgow, and of Berlin. His first pastorate (in 1861) was at Bathgate, Linlithgow, Scotland. In 1877 he was principal of Airedale (Congregational) College at Bradford, England, and from 1878 to 1883 Muir lecturer in the University of Edinburgh. In 1883 he was chairman of the Congregational Union of England and Wales, and in 1886 became principal of Mansfield College, Oxford. He visited America in 1890, and in 1892 delivered the lectures on the Lyman Beecher foundation at the Yale Divinity School. He has published *Studies in the Philosophy of Religion and of History* (1876); *Studies in the Life of Christ* (1880); *Religion in History and in the Life of To-day* (1884); *The Place of Christ in Theology* (1893). He made important contributions to the *Contemporary Review*, and edited the *Hibbert Lectures for 1888*, by Dr. Hatch.

FAIRBAIRN, PATRICK, a Scottish theologian; born at Greenlaw, Berwickshire, Jan. 28, 1805; graduated from the University of Edinburgh; from 1830 to 1840 had charge of various churches. In 1843 he joined the Free Church movement, and in 1853 became professor of theology at Free Church College, in Aberdeen, where he remained until 1856, when he was made principal and professor of systematic theology and New Testament exegesis in Free Church Theological College at Glasgow. In 1871 he visited the United States. Among his writings, which are especially valued by Presbyterian scholars, are *Typology of Scripture* (1847); *Commentary on Ezekiel* (1851); *Prophecy: Its Nature, Functions, and Interpretation* (1856); *Revelation of Law in Scripture* (1868); *Pastoral Theology* (posthumous, 1875). He died at Glasgow, Aug. 6, 1874.

FAIRBAIRN, ROBERT BRINKERHOFF, Episcopal clergyman; born in New York, May 27, 1818; educated at Trinity College, Hartford, and at the General Theological Seminary; held rectorships in Hudson river towns; professor in St. Stephen's College, Annandale, N. Y., in 1862; warden thereof in 1863; aided in securing a large endowment and new buildings for the college; published *The Child of Faith;* and *Morality in Its Relation to the Grace of the Gospel.* Died in Brooklyn, N. Y., Jan. 27, 1899.

FAIRBANKS, ERASTUS, manufacturer; born at Brimfield, Mass., Oct. 28, 1792; educated for the law, but gave it up on account of weak eyes. In 1824, with his brother Thaddeus, he began the manufacture of cast-iron plows and stove-castings, in St. Johnsbury, Vt., and in 1831 they gave their entire attention to making platform-scales, invented by Thaddeus in 1830. In 1836–38 Erastus was a member of the legislature, and in 1849 president of the Passumpsic Railroad Company; in 1851 and again in 1860 he was elected governor of Vermont. To religious and charitable enterprises he was a liberal giver. He died Nov. 24, 1864.—THADDEUS, brother of Erastus, was born Jan. 17, 1796. While a boy he aided his father in a saw and grist mill and in making carriages. He invented the platform-scale,



THADDEUS FAIRBANKS.

receiving a patent therefor in 1831; improvements, covered by over fifty patents, were afterward made, and these scales are now in use in all parts of the world. In 1873 he received from the emperor of Austria the cross of the Order of Francis Joseph. He died in St. Johnsbury, Vermont, April 12, 1886.

FAIRBURY, a town of Livingston County, northeastern Illinois, on the Toledo, Peoria and Western and Wabash railroads, 10 miles S.E. of Pontiac. It is rich in natural resources, receiving from the neighborhood coal, limestone, sandstone, other building-stones, particularly a micaceous quartz, which affords a fine fire-proof building material, and various kinds of clay. The working of these materials, and agriculture, form the chief employment of Fairbury and its thickly settled neighborhood. Population 1890, 2,324.

FAIRBURY, a city and the capital of Jefferson County, southwestern Nebraska, on the Little Blue River, and on the Burlington and Missouri River, the Chicago, Rock Island and Pacific and the St. Joseph and Grand Island railroads. It is 55 miles S.W. of Lincoln. It has good water-power, a flouring-mill, a foundry and one of the largest nurseries in the United States; is supplied with electricity, has water-works and has a good telephone system. Population 1890, 2,630.

FAIRCHILD, Cassius, an American soldier; born at Kent, Ohio, Dec. 16, 1828. His father removed to Wisconsin in 1846. He was elected to the state legislature in 1860, and next year was commissioned major of the Sixteenth Wisconsin Volunteers. He was disabled at the battle of Shiloh, April 6, 1862; rejoined his regiment a year later, and was engaged at the battles of Big Shanty and Kenesaw Mountain; commanded a brigade of the Third Division of the Seventeenth Army Corps during the first quarter of 1865; and was mustered out in July with the brevet rank of brigadier-general. From 1865 until his death, which occurred in Milwaukee, Wisconsin, Oct. 26, 1868, he was United States marshal for Wisconsin.

FAIRCHILD, Charles Stebbins, an American lawyer and statesman; born in Cazenovia, New York, April 30, 1842; graduated at Harvard in 1863, and practiced law in New York City. In 1874 he was deputy attorney-general of New York, and from 1876 to 1878 was attorney-general. In 1885 he was appointed assistant secretary of the Treasury, and on April 1, 1887, on the resignation of Daniel Manning, became Secretary of the Treasury in Mr. Cleveland's Cabinet, which office he held until March 5, 1889.

CHARLES S. FAIRCHILD.

FAIRCHILD, James Harris, an American theologian; born at Stockbridge, Massachusetts, Nov. 25, 1817; graduated (in 1838) at Oberlin College, where he became professor of languages in 1842; of mathematics in 1847; of moral philosophy and theology in 1858; and was elected president of that institution in 1866. He traveled in Europe, Asia and Africa in 1870–71, and in the Hawaiian Islands in 1884. His works include *Moral Philosophy* (1869) and *The Elements of Theology, Natural and Revealed* (1892). He edited *Finney's Systematic Theology* (1878) and *Memoirs of Charles Grandison Finney* (1886).

FAIRCHILD, Lucius, an American soldier and public man; born at Kent, Ohio, Dec. 27, 1831; removed to Wisconsin when a boy. He spent several years mining in California, and on his return to Wisconsin was admitted to the bar. At the beginning of the Civil War he raised a regiment and became its captain, refusing an offer of the colonelcy. He commanded the consolidated Second and Seventh Wisconsin regiments, which formed part of the "Iron Brigade" at the second battle of Bull Run. He fought at Antietam; lost an arm at Gettysburg; was commissioned brigadier-general, Oct. 19, 1863, and was soon afterward elected secretary of state of Wisconsin, serving two years. For the next six years he served as governor by successive elections. In 1872 he became United States consul at Liverpool, where he remained six years. He was consul-general at Paris in 1878–80; United States minister to Spain in 1880–82; and resigned to return home to Madison, Wisconsin. In 1886 he was elected commander-in-chief of the Grand Army of the Republic. He died in Madison, Wisconsin, May 23, 1896.

FAIRFAX, a village of Franklin County, northwestern Vermont, on a branch of the Lamoille River. It has the New Hampton Theological and Literary Institution (Baptist), and manufactories of woolens, lumber and leather. Population 1890, 1,523.

FAIRFAX, John Contee, an American physician; born at Vaucluse, Virginia, Sept. 13, 1830. He received a medical education, and practiced at Woodburne and Northampton, in Maryland. He was entitled to the title of Baron Fairfax of Cameron, in the peerage of Scotland, and was the only American citizen who possessed a title of nobility. The heir to the peerage in 1896 was A. K. Fairfax, his son, born in Northampton, Maryland, in 1870. The Fairfax estates in Virginia were the scene of George Washington's first labors as a surveyor.

FAIRFIELD, a town of Fairfield County, southwestern Connecticut, five miles S.W. of Bridgeport, on the New York, New Haven and Hartford railroad, and on Long Island Sound. It is a spot of some historic note. The last fight with the Pequot Indians took place here in 1637, and in 1779 the town was burned by the British troops under Tryon. It is now a beautiful town, a port of entry, and is a favorite summer resort. It has some manufactures and considerable trade in woolen goods, and is also a farming center. The population of the township in 1890 was 3,868.

FAIRFIELD, a town and the capital of Wayne County, southeastern Illinois, 108 miles E. of St. Louis, on the Baltimore and Ohio Southwestern and Louisville, Evansville and St. Louis railroads. It is the seat of Hayward Collegiate Institute. It contains a woolen factory and flour and saw mills. Population 1890, 1,881.

FAIRFIELD, a city and the capital of Jefferson County, southeastern Iowa, on the Chicago, Burlington and Quincy and Chicago, Rock Island and Pacific railroads, 48 miles W.N.W. of Burlington. It has canning factories, and wagons, furniture, tiles and farming tools are also manufactured. It is the seat of Parsons College, a seminary for women, a business college and a large library. Population 1895, 4,026.

FAIRFIELD, a village of Somerset County, western central Maine, on the Kennebec River, 21 miles N. of Augusta, and on the Maine Central railroad. It has canning factories, furniture factories, a tannery, foundry and a framing-mill, where buildings are manufactured entire. Population 1890, 3,510.

FAIRFIELD, a city of Clay County, southeastern Nebraska, 80 miles W.S.W. of Lincoln, on the St. Joseph and Grand Island railroad. Fairfield College is located here. It is in a farming and grazing district, and has a creamery, three grain-elevators and a syrup manufactory. Population 1890, 1,233.

FAIRFIELD, a town and the capital of Freestone County, eastern central Texas. It has two colleges. Its industries are tanning and flour and cotton-making. Population 1890, 500.

FAIRFORD, a village of Gloucestershire, southeastern central England, 9 miles E. of Cirencester, and 26 miles W.S.W. of Oxford. Its fine church, built in the fifteenth century, is famous for its 28 stained-glass windows. The village is famed as the birthplace of JOHN KEBLE; q.v., Vol. XIV, p. 24. Population, about 1,500.

FAIRHAVEN, a village of Bristol County, southeastern Massachusetts, on the east side of New Bedford harbor, 60 miles S. of Boston; a terminus of the New York, New Haven and Hartford railroad. It has good schools, and among its public buildings is a large library; it manufactures tacks, nails, castings and shoes. It is a favorite summer resort. Population 1890, 2,919; 1895, 3,338.

FAIRHAVEN, a manufacturing town of Rutland County, western Vermont, about 9 miles N.E. of Whitehall, New York, on the Delaware and Hudson railroad and on the Castleton River. It contains extensive quarries and manufactories of marble and slate. Population 1890, 2,791.

FAIRHAVEN, a city of Whatcom County, northwestern Washington, on Bellingham Bay, just south of New Whatcom and adjacent to it, on the Great Northern railroad. It is in a fertile agricultural district, and the coal and lumber produced constitute the principal industries of the city. Population 1890, 4,076.

FAIR HEAD OR BENMORE HEAD, a precipitous promontory off the north coast of Antrim, northeastern Ireland, opposite Rathlin Isle, four miles to the northwest. It is formed of Carboniferous strata, overlaid by greenstone columns. See GIANT'S CAUSEWAY, Vol. X, p. 572.

FAIR ISLE, a solitary island in the Atlantic, 25 miles S. of the Shetland Islands. It rises in one part (Sheep Craig) 480 feet above the sea. Its inhabitants, numbering a little over 200, are engaged in fishing and making woolen articles. See ORKNEY AND SHETLAND, Vol. XVII, p. 848.

FAIRLIE, ROBERT F., an English engineer; born in 1831. He introduced into Britain the American system of bogie-trucks, known in the United States as the swiveling-truck, which was applied in America to locomotives in 1832. Fairlie contracted to double the traffic capacity of a narrow tramway leading from a neighboring quarry to Portmadoc, in the county of Carnarvon, Wales. He accomplished his purpose by building the *Little Wonder* locomotive, with double swiveling-trucks, which not only moved trains of two hundred cars, but made the curving road adaptable to passenger trains. His system was so successful that it was introduced into South America, Mexico, Canada and Russia. He received a gold medal from the czar in appreciation of the service of the new engines on the St. Petersburg and Moscow railway. He was also rewarded in Britain by being made a knight. In 1884 he went to Venezuela, where he died the following year from an attack of malarial fever. He was the author of *Railways or No Railways?* (1875).

FAIRMONT, a village and the capital of Marion County, northeastern West Virginia, situated at the head of navigation, on the Monongahela River, 77 miles S.E. of Wheeling, on the Baltimore and Ohio and Monongahela River railroads. It contains a state normal school, has flour-mills, machine-shops, cigar and furniture factories, and there are coal-mines in the vicinity. Population 1890, 1,023.

FAIRMOUNT, a village and the capital of Martin County, central southern Minnesota, 111 miles S.W. of St. Paul, on the Chicago, Milwaukee and St. Paul railroad. The vicinity is a farming and stock-raising district, abounding in small lakes. The principal industries of the village are cheese and butter making. Population 1895, 2,204.

FAIR OAKS, a railroad station near Chickahominy, Virginia, on the Richmond and York River railroad, the scene of a battle fought May 31 and June 1, 1862. The engagement of Fair Oaks, or as it was termed by the Confederates, Seven Pines, was the first considerable encounter between the army of the Potomac under General George B. McClellan and the army of northern Virginia under General Joseph E. Johnston, who was succeeded by R. E. Lee during the progress of this battle. The first day's fighting was mainly at or near Seven Pines; the second day's, about Fair Oaks. Seven Pines is the junction of the Williamsburg and Nine-mile roads, seven miles east of Richmond and one mile southeast of Fair Oaks. McClellan's main army lay north of the Chickahominy. On May 23d Keyes's and Heintzelman's corps (about two fifths of McClellan's army) had crossed the Chickahominy River, and by May 30th Keyes's corps was intrenched at Seven Pines, his outposts extending to within five miles of Richmond. Heintzelman lay a few miles east. It was then that Johnston decided to attempt to crush this part of the army of the Potomac before reinforcements could be sent across the swollen waters of the Chickahominy. The attack was made May 31st, by Gen. D. H. Hill upon the divisions of Casey and Couch at Seven Pines. The superior numbers of the Confederates forced the Union troops, after an obstinate defense, to abandon their

intrenchments, but, reinforced by part of Heintzelman's corps, they renewed the fight. Meanwhile Hill also was reinforced by R. B. Anderson's brigade, and after severe fighting, which lasted till darkness interfered, the Union army was driven from its position. About seven o'clock General Joseph E. Johnston was severely wounded and taken to Richmond. Early June 1st the battle was renewed, Gen. G. W. Smith now commanding the Confederates. The Union army regained all the ground lost the first day, and after much severe fighting, during which Gen. O. O. Howard lost his right arm, compelled the Confederates to give way in disorder. No advantage was taken of the victory by the Union commander, and the final effect was equivalent to a victory for the Confederates. Confidence was restored at Richmond, and General Lee decided to defend Richmond on the lines then occupied by his army. The number actually engaged at Fair Oaks was about twenty thousand on either side. The losses on the Union side were, in killed, wounded and missing, 5,031; on the Confederate side, 6,134.

FAIRPLAY, a town and the capital of Park County, central Colorado, at the head of South Park, on the Union Pacific railroad, 117 miles S.W. from Denver. It is at an altitude of 9,964 feet above sea-level, and is the point whence the Mount Lincoln mining district derives its supplies. It is one of the oldest mining towns in the state. Its chief occupation is stock-raising and quartz-mining. Population, about 500.

FAIRPORT, a village of Monroe County, western New York, 11 miles E. of Rochester, on the Erie canal, and on the New York Central and Hudson River and West Shore railroads. It has manufactories of cream of tartar, baking-powder, flour, saleratus, barrels, staves, carriages, confectionery, canned goods, etc. Population 1890, 2,552.

FAIRY RINGS. See MUSHROOM, Vol. XVII, p. 76.

FAITHFULL, EMILY, an English authoress, and an advocate of the extension of the sphere of women's work, was born at Headley Rectory, Surrey, in 1835, her father being the Rev. Ferdinand Faithfull. She was educated at a school in Kensington, and in her twenty-first year was presented at court. Four years later she established a typographical business in Great Coram Street, London, for women compositors, which received the approval of Queen Victoria, and became known as the Victoria Press. She dedicated to the Queen a magnificent work, produced at the establishment, entitled *Victoria Regia*, in recognition of her appreciation of which her Majesty gave a royal warrant for the appointment of Miss Faithfull as printer and publisher in ordinary to her Majesty. In 1863 the *Victoria Magazine* was started, in which the claims of women to wider recognition were earnestly promoted. In 1868 she appeared as a novelist, publishing *Change Upon Change*, which reached a second edition in two months. She next made a success as a public lecturer before literary and philosophical societies. Between 1872 and 1883 she visited the United States three times, publishing a book, *Three Visits to America*, in which she graphically described various industries for women, and also her impressions of the Mormons. She was afterward engaged by the *Lady's Pictorial* as a staff contributor. In 1888, in commemoration of thirty years' work in the interests of her sex, Miss Faithfull was presented by the Queen with a signed portrait. This was followed by a civil-list pension. In 1890, by request of the Queen, Miss Faithfull visited the Queen of Roumania, who was at the time in England, for the purpose of detailing to the royal visitor the various opportunities in Britain for the employment of women. She published, besides the works mentioned, *On Some of the Drawbacks Connected with the Present Employment of Women* (1869) and *A Welcome: Original Contributions in Prose and Verse*, published on the occasion of the marriage of the Prince of Wales, and dedicated to the Princess (1863). Died at Manchester, May 31, 1895.

EMILY FAITHFULL.

FAIVRE, ANTOINE JEAN ETIENNE, a French painter, was born at Besançon, France, May 24, 1830. His first work was a portrait of Nessim-Bey (1855). This was followed by more portraits, and in 1849 he traveled in Italy, and from 1860 to 1862 in Russia. In 1864 he exhibited at the Salon a ceiling, entitled *Blind-man's Buff*, and in 1865 he painted *Flowers;* in 1867, *Idyl;* in 1869, *First Hours of the Day;* in 1870, *Family Reunion in the Park of Limois;* in 1873, *The Missive;* in 1877, *The Secret;* in 1884, *In the Conservatory;* in 1885, *Autumn and Summer*.

FAIZPUR, a town of the Bombay presidency, about 200 miles E. of Surat. It has a reputation for its dark blue and red dyes and cotton prints. Population, 9,640.

FALCIDIAN LAW. See ANNUITIES, Vol. II, p. 79.

FALCONER, ION KEITH, a Scotch Orientalist, missionary and athlete; born in Edinburgh, July 5, 1856. He was the younger brother of Lord Kintore. From Harrow he went to Cambridge, and there began evangelistic work. In London he aided in founding an assembly hall, contributing ten thousand dollars. A keen cyclist, he defeated, in 1878, the fastest rider in the world, and rode from Land's End to John O'Groat's. He wrote the article SHORTHAND in this ENCYCLOPÆDIA. He had accepted the Lord Almoner's professorship of Arabic at Cambridge, and was settled at Shaikh Othman, near Aden, Arabia, as a missionary, when his promising career was cut short by fever, May 10, 1887.

FALCONER, JOHN M., an American artist; born in Edinburgh, Scotland, May 22, 1820; went to the United States in 1836, and became prominent as an artist in water-colors. He became a member of the Society of Painters in Water-Colors, and was made an honorary member of the National Academy of Design in 1856. He organized the first exhibition of United States engravings in 1864, at Brooklyn, in connection with the United States

Sanitary Fair, and also the first chronological exhibition of American art, at Brooklyn, in 1872. Among his paintings are *Kenilworth Castle; House Where the Declaration of Independence Was Signed; Hoboken Meadows in 1852; Shakspeare's Birthplace* (the last two in water-colors). He was the author of *A Sketch of the History of Water-Color Painting* (1852).

FALCONET, a name used in the fifteenth and sixteenth centuries for a small field-gun. The ball weighed from one to two pounds, and the gun from five to fifteen hundredweight.

FALCONIDÆ. See FALCON, Vol. IX, pp. 2–4.

FALDSTOOL, a small desk in churches in England, at which the litany should be sung or said. The name is also given to a folding-stool used by Roman Catholic bishops and other prelates on certain occasions.

FALEME, a river of Senegambia, western Africa, one of the most important tributaries of the Senegal. It rises in Futa-Jallon, flows north and joins the main stream above Bakel. About 120 miles above its mouth the Falemé is interrupted by rapids and waterfalls. Up to that point it is navigable for small steamers during two months of the year.

FALERNIAN WINE, one of the favorite wines of the Romans. It is described by Horace as surpassing all other wines then in repute; but in the time of Pliny, Falernian wine had begun to decline in quality.

FALGUIÈRE, JEAN ALEXANDRE JOSEPH, a French painter and sculptor; born at Toulouse, Sept. 7, 1831. He was a pupil of Jouffroy, studied at the École des Beaux Arts, and while there gained the prix de Rome in 1859. In 1857 he sent to the Salon a plaster statue, *The Infant Theseus*, reproduced in marble in 1865. Among his other sculptures are *A Christian Martyr* (1867); *Ophelia* (1869); *Pierre Corneille* (1872); *Egyptian Dance* (1873); *The Swiss Entertaining the French Army* (1874). Among his paintings are *Near the Chateau* (1873); *The Wrestlers* (1874); *Slaughter of the Bull* (1881); *Cain and Abel* (1876); *The Beheading of John the Baptist* (1877); *Madeleine* (1887); and *Juno* (1889). In 1868 he was awarded, at the Paris Exposition, a medal of the first class; was elected a member of the Academy in 1882, and an officer of the Legion of Honor.

FALK, PAUL LUDWIG ADALBERT, a German jurist and statesman; born at Metschkau, in Silesia, Aug. 10, 1827, and educated at the Gymnasium and University of Breslau. He began his legal career in 1847, and in 1862 became councilor of the court of appeals at Glogau, and on the formation of the North German Confederation in 1867, was elected representative of Glogau. In 1868 he was assigned as privy councilor to the ministry of justice, and was employed in the codification of the laws of the German Empire. Having been made a representative of Prussia in the Imperial Council, Dr. Falk was minister of public worship and instruction in 1872, when Prince Bismarck decided on curtailing the privileges of the Roman Catholic Church, and it was he who brought forward the repressive measures called the "May Laws" (see Vol. X, p. 511). It was through the agitation caused by the passage and attempt to enforce these laws that Dr. Falk's name became widely known. When negotiations were begun for the restoration of harmony between church and state he retired from office (1879). A peerage was offered him, which he accepted for his son. In 1882 he was appointed to the presidency of the court at Hamm.

FALKLAND ISLANDS OR LES ILES MALOUINES, a British colony in the South Atlantic. For history and earlier statistics, see FALKLAND ISLANDS, Vol. IX, pp. 14–16. South Georgia, an island 800 miles E.S.E., has been annexed to the colony. Its area is 1,570 square miles, but it is snow-covered, sterile and uninhabited. The present area of the Falklands is 8,070 square miles, with a total population of 1,890. The chief town is Stanley, with a population of 700. The government is administered by the governor, assisted by an executive and legislative council. There were, in 1892, two government schools, with 142 pupils; one Catholic school, with 51 pupils, and one school at Darwin, with 23 pupils. There are no naval or military forces. The total revenue for 1889 was $57,425; expenditures, $54,740; imports, $350,690, and exports, $631,560. Sheep-farming is the chief industry, 2,325,154 acres being devoted to sheep-pasturage. In 1892 there were in the colony 3,824 horses, 6,321 cattle and 667,344 sheep.

FALKLAND, VISCOUNT. See CARY, SIR LUCIUS, Vol. V, p. 170.

FALKÖPING, a town in southern Sweden, 48 miles N.E. of Göteborg, and connected with it by rail. Here, in 1389, the Danish Queen Margrethe conquered and took prisoner the Swedish King Albrecht. The victory led to the union of Kalmar, when Sweden, Norway and Denmark were united under one crown. Population 1891, 5,000.

FALLING BODIES. See GRAVITATION, Vol. XI, pp. 66–75.

FALLOPIAN TUBES. See MAMMALIA, Vol. XV, p. 368.

FALLOW DEER. See DEER, Vol. VII, p. 24.

FALLOWING–GROUND. See AGRICULTURE, Vol. I, pp. 337, 340.

FALLOWS, SAMUEL, an American Reformed Episcopal Church bishop; born at Pendleton, near Manchester, England, Dec. 13, 1835, and arrived in the United States at the age of ten. He graduated at the University of Wisconsin in 1859, in which year he became vice-president of Gale College, Galesville, Wisconsin. In 1861 he was ordained in the Methodist Episcopal Church. He served in the Civil War, entering the service as chaplain, and because of the courage displayed by "the fighting parson," emerging as brevet brigadier-general. Later he was a pastor in Milwaukee, and in 1871 became state superintendent of public instruction for Wisconsin, twice receiving a re-election. In 1874

BISHOP FALLOWS.

he became president of the Illinois Wesleyan University. In 1875 he was made rector of St. Paul's Reformed Episcopal Church, Chicago, and the following year became editor of the *Appeal*, the organ of the Reformed Episcopal Church. In July of the same year he was chosen bishop. He has published some valuable educatiónal works; among them, *Hand-Book of Synonyms* (1883); *Hand-Book of Briticisms, Americanisms, Provincial Words, etc.* (1883); and *A Complete Dictionary of Synonyms and Antonyms* (1888). Was elected presiding bishop June 9, 1897.

FALL RIVER, a city of Massachusetts (see Vol. IX, p. 16). Fall River has now become the greatest cotton-goods manufacturing center in America. In 1891 the number of cotton-manufacturing companies was 40, owning 65 mills, with an incorporated capital of $20,643,000, and a probable investment of $40,000,000. These mills contained 2,128,228 spindles, which is nearly one sixth of all the spindles in the country, and about one fifth of all in New England. The mills contain 49,586 looms, and manufacture three fifths of all American print-cloths. The bleaching and dyeing of cotton goods is carried on extensively, as is also the printing of calicoes. The streets of the city are broad, well shaded with trees, and lighted with both gas and electricity. The United States Custom-House and Post-Office Building is one of the finest government buildings in the country. It is built of gray rock-faced ashler, with trimmings of red and gray granite, and was completed in 1880. The city hall is also a fine building. The city is well supplied with public schools, and annually appropriates $175,000 for the support of the high school, which has English, classical and mixed courses. The Durfee High School building was donated to the city in 1887, and is a stately granite structure, thoroughly equipped with astronomical observatory and chemical and philosophical apparatus. The city has a free public library, containing 36,000 volumes. Population 1885, 56,870; 1895, 89,203, being an increase in ten years of 57 per cent.

FALLS CITY, a city and the capital of Richardson County, southeastern Nebraska, in the great Nemaha valley, nine miles W. of the Missouri River, on the Missouri Pacific and Burlington and Missouri River railroads. It contains flour-mills, a pork-packing house, a foundry, a broom factory, a windmill factory and steam grain-elevators. Population 1890, 2,102.

FALMOUTH, a town and the capital of Pendleton County, northern Kentucky, on the Licking River, at its junction with the South Licking, 35 miles S. of Cincinnati, Ohio, on the Louisville and Nashville railroad. It has an academy, a woolen mill, a saw-mill, a distillery, a creamery and a canning factory. The principal occupation of the vicinity is tobacco-raising and farming. Population 1890, 1,146.

FALMOUTH, a seaside resort of southwestern Barnstable County, southeastern Massachusetts, on Buzzard's Bay, and on the New York, New Haven and Hartford railroad. It has, at Wood's Holl (q.v., in these Supplements), a good harbor, which is deep, and never freezes. Population 1890, 2,567.

FALSE BAY, an inlet of the Atlantic, in Cape Colony, Africa, its west side being formed by the Cape of Good Hope. It is about 22 miles in length and breadth. Here is a station of the Cape naval squadron, known as Simon's Bay.

FALSE IMPRISONMENT, the unlawful restraint of the liberty of another. The offense will amount to false imprisonment whether the unlawful detention be by confinement in a place made for imprisonment generally, or merely one made use of for the occasion; or even forcible detention without the use of doors or locks, and in any place whatsoever. An action may be sustained for damages for false imprisonment, and in some cases an indictment may be had. The method for obtaining a release from false imprisonment is by writ of *habeas corpus*.

FALSE PRETENSES, fraudulent statements and misrepresentations made with the unlawful design and intent to thereby obtain from another money, goods, wares or merchandise without adequate compensation, or without any compensation, therefor. To constitute this offense, it is necessary that the representations shall be made concerning some present or past fact or condition. Representations as to what conditions may occur in the future are mere expressions of opinion. This offense is made punishable by the statutes in most states. For the civil remedy for this offense, see DECEIT, in these Supplements.

FALSETTO. See VOICE, Vol. XXIV, p. 276.

FAMAGOSTA. See CYPRUS, Vol. VI, p. 748.

FAMILISTS. See DAVIDISTS, Vol. VI, p. 844.

FAMILY, a group of organisms composed of genera having general structural features in common. As with species, so here no absolute limits can be defined, and in many orders the genera have so many features in common that any attempted division into families must be largely arbitrary. Some orders contain only one family. Some families contain thousands of species, while others are composed of a single genus and species. In zoölogical literature the families are usually designated by the termination *-idæ*. The botanist Gray employed the word *family* as a popular synonym for order This use was never widely adopted.

FAMILY HISTORIES, AMERICAN. See GENEALOGIES, AMERICAN, in these Supplements.

FANARIOTS, the general name given to the Greeks inhabiting the Fanar, or Fanal, in Constantinople. They first appear in history after the taking of Constantinople by the Turks.

FANDANGO, an old Andalusian dance, a variety of the seguidilla, accompanied by the guitar and castanets. In its original form, the fandango was in six-eight time, of slow tempo, mostly in the minor, with a trio in the major; sometimes, however, the whole was in a major key. Later it took the three-four time and the characteristic Spanish rhythm. There is a curious piece of history said to be connected with this dance. Soon after its first introduction in the seventeenth century, it was condemned by the ecclesiastical authorities in Spain as a "godless dance." Just as the Consistory were about to prohibit it, one of the judges remarked

that it was not fair to condemn any one unheard. Two celebrated dancers were accordingly introduced to perform the fandango before the Consistory. This they did, with such effect that, according to the old chronicler, "every one joined in, and the hall of the consistorium was turned into a dancing-saloon." No more was heard of the condemnation of the fandango. Similar dances to the fandango are the Tirana, the Polo and the Jota Arragonesa.

FANEUIL, PETER, an American merchant; born at New Rochelle, New York, in 1700; died in Boston, Massachusetts, March 3, 1743. He belonged to a family of French Huguenots. In 1742 he built, at his own cost, as a gift to Boston, Massachusetts, a public market-house. This building was destroyed by fire in 1761, but was rebuilt by the city in 1763, and in 1775 was used as a theater. During the Revolutionary period it was the meeting-place of the patriots, the "Sons of Liberty," and gained the name of "the Cradle of American Liberty." Faneuil Hall was enlarged in 1805, being made forty feet wider and one story higher. The main hall is eighty feet square, its walls being hung with the portraits of distinguished Americans.

FANINO FAVENTINO, an Italian Protestant martyr, who, being arrested at Bagna Cavallo, in 1548, for preaching a reformed religion and liberty of conscience, was visited in prison by many distinguished Italians, who were attracted by his fervor and piety, and interested themselves in his behalf. But as he absolutely refused to recant, Pope Julius III condemned him to the stake. He was strangled and his body burned in 1550.

FAN-MOTOR, a device for use with alternating electric currents. The motor is simple in design and light in weight, and will drive a 12-inch fan at one thousand revolutions per minute with a current of about one ampere. The whole apparatus, motor and pedestal, weighs only about 15 pounds, thus rendering it very portable. The motor comprises an arc-shaped laminated field-magnet and a continuously wound drum-armature having a finely laminated core and a commutator, the field-magnet and armature windings being connected in series relation. The motor is used on a fifty-volt transformer circuit, and exhibits almost no sparking. The simplicity of the device is one of its chief recommendations, presenting many analogous points of construction to a direct-current motor, except its fine lamination, which adapts it for alternating-currents. There is very little heating of the iron when the motor is in operation. It is adapted to a number of commercial and domestic uses in which but little power is required, such as the operating of fans and sewing-machines.

FANNING, a coral island in the Pacific, lying in lat. 3° 51′ N., long. 159° 22′ W. It has about 150 inhabitants, and was formally annexed by Britain in 1888, as lying in the path of a possible submarine cable between Canada and Australia. Fanning Island is also called American Island. The name of Fanning Islands is sometimes given to the whole group comprising Fanning, Christmas, New York or Washington, Jarvis and Palmyra islands.

FANNING, DAVID, an American Tory marauder of the Revolutionary period; born in Wake County, North Carolina, in 1755. He was a carpenter, but claimed to have been a planter. He traded with the Indians. Having been robbed by a band calling themselves Whigs, he became a Tory and wreaked savage revenge on his enemies, with the aid of an organized band of desperadoes. His most daring exploits were the capture, in the town of Pittsboro (while the court was in session), of the judges, lawyers and spectators, and the raiding of Hillsboro, where he seized Governor Burke and his staff, and also took Colonel Alston and a guard of thirty men from his own house. These affairs directly aided the British, and Fanning received from them a commission as colonel of militia. When the American party gained the ascendancy, Fanning was invariably excepted in all amnesties, and he therefore fled to Florida and thence to New Brunswick. There he became a member of the provincial assembly. Later, for some crime, he was sentenced to be hanged, but escaped, and was afterward pardoned. He wrote a *Narrative of Adventures in North Carolina During 1790*, which was printed in 1861. He died at Digby, Nova Scotia, in 1825.

FANNING, EDMUND, an American loyalist general; born in Long Island in 1737; died in London, England, Feb. 28, 1818. He was graduated at Yale in 1757, and practiced law in Hillsboro, North Carolina. He also became recorder of deeds, and while in this office was charged with flagrant abuses by the people of the county. Fanning was a stern loyalist, and treated all opposition to authority with extreme severity. Governor Tryon was his father-in-law, and in 1771, when the people rose *en masse* against his authority, he followed Governor Tryon to New York City as his private secretary. In 1777 he organized a body of about five hundred loyalists into a corps called the "King's American Regiment." Later he went to Nova Scotia, where, in 1783, he became councilor and lieutenant-governor; in 1786 he was governor of Prince Edward Island, which office he held for 19 years. He rose in succession to become lieutenant-general in 1799, and general of the British army in 1808. Oxford bestowed upon him the degree of D.C.L. in 1774.

FANNING, JOHN THOMAS, an American civil engineer; born in Norwich, Connecticut, Dec. 31, 1837. After leaving the public schools he studied architecture, and worked as a mechanic from 1858 until 1861, to gain a practical knowledge of construction, at the same time studying engineering. He joined the Third Connecticut Regiment on the outbreak of the Civil War, and attained the rank of lieutenant-colonel. In 1862 he commenced the practice of engineering at Norwich, and from that date until 1870 had charge of all the improvements undertaken in the city. For the next ten years he was engaged in building water-works for various municipalities, including those of Manchester, New Hampshire. In 1886 he became associated as chief engineer with the St. Anthony Falls Water Power Company of Minneapolis, Minnesota. He was also at the same time consulting-engineer for the Red River Valley Drainage Commission. He was elected a fellow of the Ameri-

can Association for the Advancement of Science, and wrote *A Popular Treatise on Water-Supply Engineering*, which reached a fifth edition in 1886.

FANNING-MACHINE, a machine employed to winnow grain (see *Winnowing-Machines*, under AGRICULTURE, Vol. I, p. 326). The earliest invention of the fanning-machine is attributed to a Scotch farmer, Andrew Rodger, in 1737. It met with strong opposition and prejudice.

FANS. See GABOON, Vol. X, p. 3.

FANTAIL PIGEON. See DOVE, Vol. VII, 379.

FANTASIA. See MUSIC, Vol. XVII, p. 96.

FANTEES. See ASHANTEE, Vol. II, p. 681.

FAN-TRACERY VAULTING. See *Groined Vaulting*, under ARCHITECTURE, Vol. II, p. 465.

FARAD. See TELEGRAPH, Vol. XXIII, p. 116.

FARALLONES, a group of six small islands off the coast of California and belonging to that state, 32 miles W. of the Golden Gate. They are breeding-places for gulls and murres; and great quantities of eggs are gathered there for the San Francisco trade. Great numbers of sea-lions inhabit them, and occasionally a seal is seen. The largest and most southern isle has a lighthouse with a flashing light of the first order, 360 feet above sea-level, lat. 37° 41′ 49″ N., long. 122° 59′ 5″ W.

FARCE. See DRAMA, Vol. VII, pp. 395, 435–38.

FARCY. See GLANDERS, Vol. X, p. 634; VETERINARY SCIENCE, Vol. XXIV, p. 202.

FARDEL-BOUND, a disease of domesticated ruminants, the cause of which is the impaction of the fardel, or third stomach, the folds of which become dry, and refuse to exercise their normal function of returning the cud to the mouth to be remasticated. This impaction and paralysis are due to improper food of a dry, indigestible kind, such as over-ripe clover, rye-grass, hay, vetches, etc., which the stomach cannot sufficiently moisten. The "loss of cud" is a symptom, merely, of this disease, so that all attempts to attain the return of the cud are useless and only attempted by quacks. Other symptoms exhibited are stupidity, fever, dry nose, and sometimes grunting from discomfort. The treatment is the giving of mild purgatives, such as Epsom salts, and mashes of bran or gruel drenches, to which a stomachic may be added, such as ginger; molasses is also excellent. Sometimes clysters of soap and water are very useful. The object is to get rid of the impaction, and to tone up the stomach for renewed effort.

FAREWELL, CAPE, the southern extremity of Greenland, in lat. 59° 49′ N., long. 43° 54′ W.; is generally beset with ice, which seems to come from the northeast and sweep round into Davis Strait.

FARGO, a city, the capital of Cass Co., N. Dak., at the head of navigation on the Red river of the North, and on the Great Northern and Northern Pacific railroads, opposite Moorehead, Minn.; is a great wheat market; has the largest farm-machinery depot in the northwest; a Presbyterian seminary, Roman Catholic Academy, Congregational college; and water-works, gas and electric lights, and a telephone system. On June 7, 1893, a fire destroyed half the town, the loss being over $3,000,000. Pop. 1890, 5,664.

FARGUS, FREDERICK JOHN, an English novelist who wrote under the pseudonym of "Hugh Conway"; born at Bristol, Dec. 26, 1847, the son of an auctioneer. In 1861 he entered the training-ship *Conway*, stationed in the Mersey, intending to adopt the sea as a profession. Hence his pseudonym. The father wished the son to become an auctioneer. The lad did so, but found relaxation in writing verses and tales for the newspapers. He published a volume of verses in 1879; in 1883 he removed to London; and in 1884 *Called Back* appeared as volume I of Arrowsmith's Bristol Library. This book had wide popularity and sale, a dramatized version, by Comyns Carr, further adding to his fame. *Bound Together*, a collection of tales, appeared in 1884. Then followed *Dark Days*, an even greater success than *Called Back; At What Cost, and Other Stories* (1885); *Slings and Arrows* (1885); *A Cardinal Sin* (1886); *Carriston's Gift, and Other Stories* (1886); *Living or Dead* (1886); *Somebody's Story: An Exact Reproduction of Hugh Conway's Original Manuscript* (1886); *Life's Idylls* (1879; new ed., 1887); *Lays and Lyrics* (1887). Died at Monte Carlo, May 15, 1885.

FARIBAULT, a city, the capital of Rice Co., Minn., 47 miles S. of St. Paul, at the confluence of the Strait and Cannon rivers, and on the Chicago, Milwaukee and St. Paul and Minneapolis and St. Louis railroads; has several factories, chiefly those which manufacture from wool, grains, and wood; a state asylum for the deaf, dumb, and blind; Seabury Divinity College, Shattuck School for (boys), and St. Mary's School (for girls), all three Protestant Episcopal. Pop. 1895, 7,616.

FARINA, the popular name of the meal or flour of the cereals. The name is generally applied to the article of food prepared from finely powdered white maize, or Indian corn. Farina is also obtained from the seeds of leguminous plants, such as the pea or bean. As the chief constituent of farina is starch, the name is applied to the starchy substances obtained from the tubers of potatoes; also from some stems, as sago. All such substances are referred to as farinaceous. The pollen of flowers collected by bees, and used by them in the manufacture of bee-bread, is also called farina, from the fact that the name was formerly given to the pollen itself.

FARINA, SALVATORE, novelist, "the Italian Goldsmith"; born at Sorso, Sardinia, Jan. 10, 1846. His works, which were at once successful, include *Two Amours* (1869); *A Secret* (1870); *Forbidden Fruit; Romance of a Widower; The Hundred Eyes of Love; Dounina's Treasure; Courage and Onward; Through the Beautiful Eyes of Glory; Little Don Quixote* (1890); *Living for Love* (1890); *For Life and Death* (1891); *Last Battle of Priest Agostino;* and *Capelli Bianchi.*

FARJEON, BENJAMIN LEOPOLD, an English novelist; born in London, England, of Jewish parentage, May 12, 1833. He spent some years as a journalist in New Zealand and Australia, and in 1869 returned to London, where he commenced his career as a writer of novels, dealing mostly with low life, from which he has been characterized as a follower of Dickens. His first story, *Grif*, dealing with Australian life, appeared in 1870; and among his

other better-known books are *Blades o' Grass* (1874); *Bread and Cheese and Kisses* (1874); *The Duchess of Rosemary Lane* (1876); *Solomon Isaacs* (1877); *Great Porter Square: A Mystery* (1884); *Molka Christmas Angels* (1886); *Three Times Tried* (1886); *Toilers of Babylon* (1888); *Ties* (1891); and *For the Defense* (1892); *The Last Tenant* (1893); *Something Occurred* (1893); *A Fair Jewess* (1894); and *The Betrayal of John Fordham* (1896). In 1877 Mr. Farjeon married a daughter of Joseph Jefferson, the American actor.

FARLEY, James Lewis, an English financier and author; born in Dublin, Sept. 9, 1823. On the formation of the Ottoman Bank in 1856, Mr. Farley was appointed chief accountant of the Beyrout branch, and in 1860 he received the appointment of accountant-general of the State Bank of Turkey at Constantinople. He was special correspondent to the London *Daily News* during the Sultan's visit to Egypt in 1863, and was the author of *Two Years in Syria* (1858); *The Druses and Maronites* (1861); *The Resources of Turkey* (1862); *Banking in Turkey* (1863); and *Turkey* (1866). He was an authority on Bulgarian affairs, having been privy councilor in the public works department of that country. From 1870 until 1884 he was Turkish consul at Bristol; and was a corresponding member of the Institut Égyptien de France. He died Nov. 12, 1885.

FARLOW, William Gilson, an American botanist; born in Boston, Massachusetts, Dec. 17, 1844; graduated at Harvard University in 1866, and in the medical department in 1870. He studied in Europe, and on his return was made adjunct professor of botany at Harvard in 1874, and professor of cryptogamic botany in 1879. He was a fellow of the American Association for the Advancement of Science, a member of the National Academy of Sciences, and an authority of wide repute in his chosen field of research. His works include *The Potato-Rot* (1875); *Diseases of Olive and Orange Trees* (1875); *The Gymnosporangia, or Cedar Apples of the United States* (1880); *The Marine Algæ of New England* (1881); *Introduction to Cryptogamic Botany* (1888); and, with Arthur Bliss Seymour, *Provisional Host-Index of the Fungi of the United States* (1888).

FARMER CITY, a city of Dewitt County, northwestern central Illinois, 24 miles S.E of Bloomington, on the Cleveland, Cincinnati, Chicago and St. Louis and Illinois Central railroads. It is in a rich agricultural district, of which it is the trading center, and is especially noted for its fast horses. Population 1890, 1,367.

FARMERS-GENERAL (Fr., *fermiers généraux*), the name given to a privileged association in France which flourished previous to the revolution of 1789. The members were granted the privilege of collecting the taxes on certain branches of the revenues of the nation. This system of tax-gathering became general in France from the year 1546, when Francis I let out the *gabelle*, or salt-tax, in this way. The privileges of the position were sold to the highest bidder, but they were largely in the hands of the king's favorites The powers, rights and duties of the class were defined by special decrees; but however severe may have been the fiscal laws against fraud and contraband, it is notorious that shortly before the Revolution abuses of the most flagrant description had demoralized the system and the men. During the Revolution most of these obnoxious tax-gatherers perished on the scaffold, the innocent among them being occasionally confounded with the guilty. About thirty farmers-general were executed in 1794. Farmers of the revenue was also an institution of ancient Rome. Tolls on roads and duties of various kinds were at one time farmed, also, in Great Britain.

FARMERS' INSTITUTES, organizations in different states, which, by holding meetings within the state, provide the agriculturist and stock-raiser with the opportunity of keeping abreast of the times. These institutes are organized in connection with the board of agriculture of the state, or independently, though often with some indirect communication existing between them and the former institutions. The best results are attained under the superintendence of an official appointed by the state board of agriculture, especially when the latter has control of the agricultural college. In such case the state board acts as an executive patron, aiding directly in the raising of the needful funds to carry on the institutes to the best advantage. Lecture courses are provided, which usually last the greater portion of a week. The latest discovery or invention, or the addition to the list of improved breeds, is discussed, and its mission determined. Similarly, improved methods of cultivation, stock-raising, dairying, beef-raising, mutton or wool production, etc., are but a few of the important matters that are passed in review at the meetings. Discussions follow, and the farmer becomes impressed with the value of a liberal education, and soon realizes that he can obtain substantial aid from the laboratory of the scientist, while the agricultural professor comes in contact with the man of practical experience and obtains many a suggestion from the cultivator.

The institute movement is not new, the New York State Agricultural Society having inaugurated similar meetings and lectures in 1842. In 1859 the Massachusetts State Board of Agriculture endeavored, with but moderate success, to establish systematic courses. In Michigan, in 1861, the state authorized the board of agriculture, which, in that state, has control of the Agricultural College, to institute winter courses of lectures for others than students of the Agricultural College, under necessary rules and regulations. It was not, however, until ten years later that such a scheme was practically materialized. This was, however, the first attempt to make these lectures an integral function of the state agricultural institutions. These state organizations have stimulated the origination of many local and county clubs, as well as institutes in connection therewith. The state of New York appropriates $15,000 per annum for the expenses connected with their institutes, and other states follow with smaller sums. The institute movement is most lively in the Northern and Northwestern states.

FARMERS' ORGANIZATIONS. The earliest of the great farmers' organizations was that of the Patrons of Industry, a secret order, with ritual and

"degrees of work," suggested by those of the Masonic and Odd Fellows fraternities. The scheme was devised and formulated and publicly announced Aug. 5, 1867, by William Saunders, then superintendent of the United States government gardens and conservatories in Washington, District of Columbia. Mr. Saunders, having occasion to visit western New York, Ohio and other Western states, took with him the ritual and plan of "work" under the first degree, which had been formulated in Washington, and interested five others in the new order. Later in the autumn, the work of the second, third and fourth degrees was formulated, and the name *Patrons of Husbandry* given to the order. At Washington, in December, 1867, nine persons, who had taken the four degrees, met and organized the National Grange. The constitution provided for the admission of women to membership, and also for the election of four ladies as officers, to be designated Ceres, Pomona, Flora and Lady Assistant Steward. The chief objects of the organization were stated to be "the promotion of unity and co-operation among the tillers of the soil, and the diffusion of a higher measure of intelligence and culture." Seven years later there were reported about twenty-two thousand granges, with a membership reaching up into hundreds of thousands. During the year 1888 over two hundred granges were added. A year later the membership, including men and women, was reported at over half a million, and in 1890 the subordinate granges at about twenty-six thousand. The laws governing the order in essential matters originate in the National Grange, from which, also, emanate the charters of all local, county or state granges.

The first farmers' alliance was organized in Texas in 1873, for the purpose of coöperation against cattle-thieves, but as it increased in numbers its scope was extended, and in 1880 it was chartered by the state of Texas as a benevolent institution. In 1887 it had reached a membership of over one hundred thousand, and then united with the Farmers' Union of Louisiana, which reported a membership of ten thousand. These two bodies thus consolidated were incorporated under the laws of the District of Columbia as the National Farmers' Alliance and Coöperative Union. About the date of the Texas organization (1873), another farmers' alliance was organized in the state of New York, and spread westward as a non-secret order, and became a strong body north of the Ohio River and west of Pennsylvania. The *National Agricultural Wheel*, a league or guild similar in scope and aims to those of the Grange, was founded in Prairie County, Arkansas, in 1880, and soon reported numerous branches and a large membership in the Southwest.

The National Farmers' Alliance and Industrial Union is the outcome of the union consummated in St. Louis, Missouri, Oct. 1, 1889, between the National Farmers' Alliance and Coöperative Union and the National Agricultural Wheel, the new name being given to the united societies at the annual meeting held in that place on that date. The new society thus created was then credited with a total membership estimated at from 1,600,000 to 2,500,000.

At the meeting at Ocala, Florida, held in December, 1890, a series of resolutions was adopted, which became known as the "Ocala Platform," and was substantially as follows: The abolition of national banks; the establishment of subtreasuries, where the government should loan money to farmers at a low rate of interest; the increase of the circulating medium to not less than fifty dollars *per capita;* the prevention of dealing in futures on agricultural and mechanical productions; the free and unlimited coinage of silver; the prohibition of the alien ownership of land, and the restoration to the government of all such lands, as well as those owned by corporations in excess of their reasonable needs; the extension of free trade; the establishment of a graduated income tax; the limitation of national and state taxes to the absolute needs of an economically administered government; and the government ownership of all means of communication and transportation.

One of the remarkable features of the meeting at Ocala was the development of a feeling in favor of an independent political party movement—a movement which would be likely to engage the attention and sympathy of all the various farmers' organizations, and at the same time be sufficiently unrestricted in its membership to open its doors to such "honest persons" as are shut out from membership in most, if not all, of the other farmers' societies. There was already at hand an organization which seemed adapted to meet the want indicated. Nearly a year previous, the *Citizens' Alliance* was started in Kansas, and had already a large membership in that state, and in Nebraska and Iowa. A national organization was perfected at Ocala. The declaration of principles stated that "the organization is formed for the purpose of coöperating with the Farmers' Alliance, the Knights of Labor and other orders in the support of the St. Louis platform [which embraced largely the same items adopted at Ocala] 'and to this end the organization is political in its nature.'"

The National Farmers' Political League is a non-secret, independent, non-partisan organization. Its work is directed toward securing a just representation and treatment of the agricultural interests in Congress and in the legislatures, and due recognition of farmers in all public affairs, without conflicting with the best interests of the entire people. It consists of a national league, and of state leagues, with county and town leagues. The national league has general supervision of the affairs of the Farmers' League and the work of organization, and attends specially to the farmers' interests in Congress. The state leagues, as soon as organized, push the work of organization in their respective states, and attend to the farmers' special interests in the legislature. The county league attends to the farmers' interests in county matters, and to affairs in Senatorial and Representative districts. The town leagues furnish the delegates who constitute the county leagues, and attend to the farmers' interests in local districts and in each election precinct.

Other important organizations are the Farmers' Mutual Benefit Association, which claims to have a half-million members, mostly in the Western states; the National Farmers' League, mainly an eastern association; the Patrons of Husbandry, with headquarters in Michigan and membership in that and adjacent states; the National Colored Farmers' Alliance and Coöperative Union, composed of negroes, and naturally strongest in the Southern states; the National Farmers' Alliance, which was organized in Chicago in 1880, and is composed of state alliances in fifteen states, with societies in others. The principles of the National Farmers' Alliance are very much the same as those included in the "Ocala Platform." They, however, refer more forcibly to the preservation of the pooling clause in the Interstate Commerce Law; to the extension of the franchise to women, and giving them pay equal to that of men for equal work; and to the enactment by Congress of laws forbidding the sale of options on produce in exchanges of the country.

The chairman of the National Farmers' Alliance and Industrial Union at Ocala issued a call in 1891 for a meeting of "delegates from all the organizations of producers," and included the People's Party, the Independent Party, the Knights of Labor, etc. This confederation of parties met, in its first annual convention, as the People's Party, at Omaha, July 2, 1892. On the Fourth of July it adopted a platform, in which it declared for a union of labor forces, free coinage of silver, increase of the circulating medium, a graduated income tax, government ownership of the telegraph and telephone, reclamation of lands from aliens, the eight-hour law, limitation of the office of President to one term, and opposition to all subsidies to private corporations. Its candidates were General James B. Weaver of Iowa for President, and General James Field of Virginia for Vice-President. A fusion with other parties was made in some of the states. The People's Party received 1,055,424 popular and 22 electoral votes. See PEOPLE'S PARTY, in these Supplements.

FARMINGTON, a village of Hartford County, central Connecticut, on the Farmington River, and on the New York, New Haven and Hartford railroad, 31 miles N. of New Haven. It has important manufactories and a school for girls. Population 1890, 3,179.

FARMINGTON, a city of Van Buren County, southeastern Iowa, on the Des Moines River, 38 miles above its mouth, and on the Chicago, Burlington and Kansas City and Chicago, Rock Island and Pacific railroads. It has electric lights and city water. It has a woolen factory, grist-mill, cigar factories, broom, truss, wagon and carriage factories. Population 1895, 1,296.

FARMINGTON, a village and the capital of Franklin County, western Maine, on the Sandy River, and on the Sandy River and Maine Central railroads. It has a state normal school, besides other excellent schools. It contains machine-shops, saw, shingle and clapboard mills, a drum factory and a spool-factory. It is supplied with electric lights and city water. Population 1890, 1,243.

FARMINGTON, a village of Dakota County, southeastern Minnesota, on the Vermilion River, and on the Chicago, Milwaukee and St. Paul (two branches) railroad, 20 miles S. of St. Paul. The village contains a flouring-mill, and shoe and carriage manufactories. It has a large wheat-elevator, and is located in a wheat-growing region. Population 1896, 800.

FARMINGTON, a city and the capital of St. François County, southeastern Missouri, two miles N.E. of Rock Springs, which is on the St. Louis and Iron Mountain railroad. It is on a good turnpike, which connects Ste. Genevieve and Iron Mountain. It is the seat of the Elmwood Female Seminary, Carleton College, Baptist College, and has good public schools. Lead-mines are worked in the vicinity quite extensively. Population 1890, 1,400.

FARMINGTON, a village of Stafford County, southeastern New Hampshire, on the Cocheco River, and on the Boston and Maine railroad, 28 miles N.E. of Concord. It has a high-school, and manufactories of boots, shoes and lumber. Population 1890, 3,064.

FARMINGTON, a city and the capital of Davis County, central northern Utah, on the Great Salt Lake, and on the Rio Grande Western and Union Pacific railroads, 18 miles N. of Salt Lake City. The town is a fruit-raising center, and is provided with irrigating ditches and with water from the mountain reservoirs. Some of the streams are used for water-power in mills, the water being then led down through the farms. Population 1896, 1,000.

FARMS IN THE UNITED STATES. See AGRICULTURE, in these Supplements.

FARMVILLE, a town and the capital of Prince Edward County, south central Virginia, on the Appomattox River, 70 miles S.W. of Richmond, on the Norfolk and Western railroad, and a terminus of the Farmville and Powhatan. The tobacco trade is the principal business and the place contains tobacco factories and a college for women. Hampden-Sydney College and the Union Theological Seminary are located seven miles distant. Population 1890, 2,404.

FARNAM, HENRY WALCOTT, an American political economist; born at New Haven, Connecticut, Nov. 6, 1853; graduated at Yale in 1874; studied in Germany, and received the degree of doctor of political science from Strasburg University in 1878. From 1878 until 1880 he was a tutor in Yale, and in 1880 was appointed professor of political economy. In 1881 he was made professor of political economy in Sheffield Scientific School.

FARNBOROUGH, LORD, better known as Sir Thomas Erskine May, an English jurist; born in 1815; educated at Bedford School, and became assistant librarian to the House of Commons in 1831. He was called to the bar in 1838, and was later appointed examiner of petitions for private bills and taxing-master of the House. In 1871 he was appointed clerk of the House. He was made a Companion of the Bath in 1860, and Knight Commander in 1866. He resigned his office of clerk, April 15, 1886, received a vote of thanks from the House for his public services, and was soon afterward gazetted

a peer of the realm, with the title of Baron Farnborough, but did not live to take his seat, dying May 17th of the same year. He published several standard works on the law and practice of Parliament, the more important being *A Treatise on the Law, Privileges and Proceedings of Parliament* (1844), which was translated into German and Hungarian; *Constitutional History of England Since the Accession of George III, 1760–1860* (3d ed. 1871); and *Democracy in Europe: A History* (1877).

FARNE ISLANDS. See NORTHUMBERLAND, Vol. XVII, p. 564.

FARNESE BULL. See ARCHÆOLOGY, Vol. II, p. 365.

FARNHAM, ELIZA WOODSON BURHANS, an American philanthropist; born at Rensselaerville, New York, in 1815; wife of Thomas Jefferson Farnham (q.v.). In 1844 she became matron of the New York state prison at Sing Sing, and in 1848 became connected with the management of the institution for the blind at Boston. From 1849 to 1856 she was in California, and in 1859 organized a society in New York to assist destitute women to find homes in the West. Subsequently she returned to California. She wrote *Life in the Prairie Land* (1846); *California: Indoors and Out* (1856); *My Early Days* (1860); *Woman and Her Era* (1864); *The Ideal Attained* (1865). She died in New York City, Dec. 15, 1864.

FARNHAM, ROSWELL, an American soldier and statesman; born in Boston, July 23, 1827; removed with his parents to Brattleboro, Vermont, in 1840; was graduated at the State University in 1849; admitted to the bar of Orange County in 1857, and was state attorney from 1859 to 1861. In 1861 he joined the First Vermont Regiment as lieutenant, and rose to be lieutenant-colonel of the Twelfth Vermont Regiment. After being prominent in political circles for many years, he served as governor of the state from 1880 to 1882.

FARNHAM, THOMAS JEFFERSON, an American author; born in Vermont in 1804. In 1839 he organized and took charge of an expedition across the continent from Vermont. While in California he obtained the release of a large number of American and English citizens who had been imprisoned by the Mexican government. He published *Travels in Oregon Territory* (1842); *Travels in California* (1845); *The Northwest Boundary Line* (1845); and *Mexico: Its Geography, People and Institutions* (1846). He died in California in 1848.

FARO, a game of cards in which the players bet on the order in which the cards will appear when taken singly from the box in which they are placed by the dealer, who is also the banker. A long table is required, at the middle of which, at one side, sits the dealer. In front of him is the box in which he places the cards, face up, after shuffling. The faro-box has a slit at one end, through which the dealer can slide the cards one at a time; there is, also, a spring, which keeps the cards level with the slit. At the right of the dealer the checks used for betting are piled, and at this end, also, is the "case-keeper," an arrangement by means of which each "turn" of two cards may be recorded for the benefit of the players. Any player may be case-keeper, the name applying to the person as well as the device. The players sit around the table, on three sides, and any may keep tally of the turn of the cards for himself. On the table itself is the "lay-out," or representations of the cards thereon, arranged in duplicate, one set on each end of the table, to accommodate all the players. The cards represented number thirteen, from the ace up to the king, in regular order. The players make their bets upon the cards which they think may appear, and bets may be placed on any number of cards by the same player. The top card is then removed from the box by the dealer; this card is called the "soda" card, and does not count in the game. The dealer places it to his right. He then removes the next card, which "loses," and places it above the soda card. The dealer claims all bets made by the players on this card, unless it is "coppered." The third card, which "wins," and upon which the dealer has to pay sums equal to those wagered by the players, is removed and placed to the left of the losing or soda cards. The game then proceeds in the same way, the fourth card losing and placed on the soda pile, and the fifth winning and placed on the winning pile. But sometimes the losing and the winning cards are of the same denomination, in which case they are called "split," and in all such cases the better loses half his stake. Again, any card may be "coppered," by placing a copper, button or other recognized article on the card, and this changes the bet, so that if the card would ordinarily have lost, it now wins, and *vice versa*. The "showing" of two cards is a "turn"; and after each turn, new bets are made for another, and this continues to the last three cards in the pack. The only betting allowed after this is termed "calling the turn," or guessing which card will show first, or guessing the order in which the last two cards will show. The last card is called the "hock" card; hence "from soda to hock" has become a synonym for "from first to last." There are different ways of betting on the last turn. The game is played as above in America, and substantially in the same manner in Europe. The origin of the name is supposed to be due to a former representation of a figure of Pharaoh on one of the cards.

FARR, WILLIAM, an English medical statistician; born at Kenley, Shropshire, Nov. 30, 1807; died in London, April 14, 1883. He studied medicine at the universities of Paris and London; graduated from University College in 1833, and devoted himself to the study of vital statistics. Through his efforts, great improvement was made in the collection of data for that department; the registration of all the deaths in England, and their causes, was begun, and Dr. Farr was given a position in the registrar's office. He was assistant census commissioner of Great Britain from 1851 to 1881; in 1855 was elected a fellow of the Royal Society; and in 1859 received from the University of Oxford the degree of D.C.L. He was a frequent contributor to the *British Annals of Medicine;* and his paper on *The Construction of Life Tables* (1859), his introduction to the *English Life Tables* (1864), and *Statistical Nosology*, are of great value.

FARRAR, Frederic William, an English preacher and author, dean of Westminster since 1895, chaplain to the Speaker of the House of Commons (1890–95), and chaplain in ordinary to Queen Victoria; born in Bombay, India, Aug. 7, 1831. He was educated at King's College, London; became a classical exhibitioner of the University of London, and was successively a scholar and fellow of Trinity College, Cambridge, gaining, among other university honors, the chancellor's prize for English verse. He became a deacon of the English Church in 1854, and three years later was admitted into priest's orders. For sixteen years he was a master at Harrow, and in 1871–76 held with distinction the head-mastership of Marlborough College. At Cambridge, Dr. Farrar was a select preacher before the university, and in 1870 delivered the Hulsean lectures, published as *The Witness of History to Christ* (1870). In 1876 he became rector of St. Margaret's, London, and canon of Westminster; and in 1883 archdeacon of Westminster and rural dean. As an author, Dr. Farrar first came into note by his stories of school life, *Eric; or, Little by Little* (1858); *Julian Home* (1859); and *St. Winifred's; or, The World of School* (1862); and by a series of philological works, the chief of which are *Chapters on Language* and *Families of Speech*, (rev. ed. in 1 vol., 1878). His educational works embrace *Greek Grammar Rules* (6th ed., 1865); *Greek Syntax* (3d ed., 1867); *Public School Education* (a lecture with notes, 1867); and an edited volume of *Essays on a Liberal Education* (1868). His theological works are marked by great Biblical erudition and a florid, rhetorical style. The best known are: *Life of Christ* (1874); *Life of St. Paul* (1879); *The Early Days of Christianity* (1882); *Seekers After God* (1883); *Solomon: His Life and Times* (1887). In 1878 appeared *Eternal Hope*, in which its author opened the door of hope to friends of the impenitent dead. The most important of his volumes of sermons are: *The Fall of Man* (1865); *The Silence and Voices of God* (1873); *The Messages of the Books* (1885); *Every-Day Christian Life* (1887); *In the Days of Thy Youth*, and *The Voice from Sinai* (1892); *Sermons* (1893); and *The Second Book of Kings* (1894). He also delivered the Bampton lectures for 1885, on *The History of Interpretation;* and wrote *Sketches of Church History* (1889); *Lives of the Fathers* (2 vols., 1889); *Places that Our Lord Loved* (1891); *Social and Present Day Questions* (1891); *The Life of Christ as Represented in Art* (1894); *The Young Man Master of Himself* (1897); *The Bible, Its Meaning and Supremacy* (1897); *The Herods* (1897); and *The Life of Lives* (1899). *Darkness and Dawn* (1892) is a story of Nero's time; and *Gathering Clouds* (1895) of Chrysostom's. Dr. Farrar's popularity as a writer has hardly kept pace with his literary productiveness, except in the case of his eloquent *Life of Christ*, of which edition after edition appears, together with numberless translations.

DEAN FARRAR.

FARRAR, Henry, an American artist; born in London, England, March 23, 1843; emigrated to the United States, and first gained distinction for his work in water-color, and afterward became noted as a landscape-painter. In 1879 he became secretary of the American Water-Color Society, and in 1881 president of the New York Etching Club. Among his best-known works are *The Silent Tongue* (1872); *A Windy Day* (1876); and *A Quiet Pool* (Paris Exposition, 1878).

FARRAR, John, an American mathematician; born at Lincoln, Massachusetts, July 1, 1779; graduated at Harvard in 1803, in which college he became professor of mathematics in 1807, resigning in 1836. He was the first to place the books of French mathematicians before the American teaching world, in the form of translations, in preference to the English authorities. Among his works are *Introduction to Algebra*, based upon Euler's work (1818), and *Elements of Algebra* (Lacroix, 1818). He edited a series of mathematical text-books, which were known as the Cambridge Course. These were adopted at West Point, and held place in the colleges for thirty years. Among Farrar's pupils who afterward became famous was Admiral Charles Davis, who founded the *American Ephemeris* (see Almanacs, American, in these Supplements). Farrar died at Cambridge, Massachusetts, May 8, 1853.

FARRIERY. See Shoes, Horse, Vol. XXI, p. 831.

FARSAN ARCHIPELAGO. See Red Sea, Vol. XX, p. 316.

FARTHINGS. See Money, Vol. XVI, pp. 733, 734; Numismatics, Vol. XVII, p. 656.

FARWELL, Charles Benjamin, an American merchant; born in New York state, July 1, 1823; removed to Illinois in 1838, and held the office of county clerk of Cook County, Illinois, in which county Chicago is situated, eight years (1853–61). He became the head of a very prosperous wholesale dry-goods house, in which business he accumulated great wealth. He was elected to Congress in 1870, as a Republican, over John Wentworth, and was re-elected in 1872 and 1874, after which he declined re-election, but was elected again in 1880. He was elected to the United States Senate in 1887, to fill the vacancy occasioned by the death of General John A. Logan. His term of service expired March 3, 1891.—His brother, John Villiers Farwell, was born in Steuben County, New York, July 29, 1825; became a merchant in Chicago, and was Indian Commissioner under President Grant. He was a prominent supporter of the Young Men's Christian Association, for which he built a hall in Chicago, and

CHARLES B. FARWELL.

he was an enthusiastic supporter of the evangelist, Dwight L. Moody.

FASHODA, a town on an island in the White Nile, 60 miles below the mouth of the Sobat tributary. It was founded by the Egyptian government in 1867 and made the capital of the neighboring province, the Shilluk territory. Since 1885, when the Mahdi overthrew Egyptian rule in the Sudan, Fashoda and the other Egyptian posts on the waterways of the Upper Nile had to be abandoned. Taking advantage of this, and actuated by jealousy of England in her attempt to recover the Sudan for Egypt and civilization, France encouraged a scientific expedition, under Major Marchand (which had entered the Sudan from French Kongo), to occupy the Bahr-el-Ghazal region and plant the tricolor at Fashoda. This Major Marchand did in July, 1898, and when the Khalifa had been defeated at Omdurman, on September 2d of that year, General (afterwards Lord) Kitchener heard of the French occupation of the territory which had been Egypt's, and he proceeded thither in a British gunboat and demanded the withdrawal of the French from the region. The demand was not complied with, Marchand averring that he could not withdraw without instructions from his government, and that he was there on the strength of a treaty with the chiefs of the neighboring Shilluk tribe, who had placed themselves under the protection of France. Though Marchand was unable to defend the post or even protect himself from Dervish attack, General Kitchener left him and his small following unmolested, and contented himself with serving a protest upon Marchand for illegal occupation, since the region was Egyptian territory recovered with the aid of British arms. Kitchener raised over Fashoda the Egyptian and British flags, and leaving a garrison to occupy the place and the neighboring post of Sobat, he descended the Nile to Khartum and made report to the British authorities at Cairo and London. Marchand similarly reported to Paris, and the question for a time vexed the diplomatic mind of the two countries and threatened war. Finally the matter was settled by France ordering Marchand and his expedition to evacuate Fashoda, the announcement being made by Lord Salisbury at a Guildhall dinner in honor of Gen. Kitchener in London, Nov. 5, 1898.

FATIGUE OF METALS. See STRENGTH OF MATERIALS, Vol. XXII, p. 601.

FAUCIT, HELEN. See MARTIN, LADY THEODORE, in these Supplements.

FAUGÈRE, ARMAND PROSPER, a French writer; born at Bergerac, Dordogne, Feb. 10, 1810; died in 1888. He was for some time employed in the department of public instruction, and subsequently became director of the archives in the Bureau of Foreign Affairs. He published *Éloge de Blaise Pascal* (1842); *Pensées, Fragments et Lettres de Blaise Pascal*, restored to their original form (1844); *Mémoires de Madame Roland* (1864); and *Fragments de Littérature Morale et Politique* (1865).

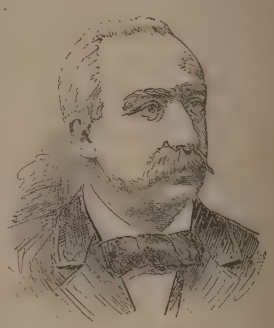
FAULKNER, CHARLES JAMES, an American lawyer and public man; born in Martinsburg, Virginia, in 1806; died Nov. 1, 1884. He became a lawyer, and sat in both branches of the legislature, and in 1851 was elected to Congress as a Democrat, and served four terms. In 1859 he was made minister to France, but was recalled by President Lincoln and imprisoned in Fort Warren, on suspicion of disloyalty. When released he joined the Confederate army. In 1874 he was elected to Congress from West Virginia. —His son, CHARLES JAMES FAULKNER, was born in Martinsburg, W. Va., Sept. 21, 1847. He went to France with his father and attended schools in Paris. In 1862 he entered the Virginia Military Academy at Lexington, and served in the Confederate army. In Sept., 1868, he was admitted to the bar; and in 1879 was elected circuit judge in West Virginia. In 1887 and 1893 he was elected United States Senator from that state, as a Democrat. In July, 1898, he was appointed a member of the Canadian-American Joint Commission.

FAULKNER'S ISLAND, a small islet in Long Island Sound, 3 miles off Sachem's Head, Conn., but belonging to New York, in lat. 41° 12′ 41″ N., long. 72° 38′ 54″ W.; has a flashing light with a fog-bell.

FAULT. See GEOLOGY, Vol. X, pp. 261, 301, 372.

FAUQUIER WHITE SULPHUR SPRINGS, in Fauquier Co., Va., 56 miles S.W. of Washington, D. C.; is delightfully situated, and the waters are of much value in certain chronic diseases. The buildings were mostly destroyed during the war.

FAURE, FRANÇOIS FELIX, President of the French Republic; born in Paris, Jan. 30, 1841. He was a journeyman currier in Touraine; became a ship-owner of Havre, and was president of the chamber of commerce of that town. During the Franco-Prussian war he was a chief of battalion of the Garde Mobile, and led from Havre to Paris volunteers, who assisted in putting down the Commune, for which services he was decorated with the ribbon of the Legion of Honor, May 31, 1871. He was first elected to the Chamber of Deputies, as a Republican, in 1881, and at the time of the formation of the Gambetta Cabinet of Nov. 14, 1881, he became Under-Secretary of State in the then new Ministry of Commerce and the Colonies. He relinquished office, with the other members of the Cabinet, in January, 1882; but he was called to fill the same office on Sept. 24, 1883, in the last Cabinet presided over by Jules Ferry, and resigned with the ministry, March 31, 1885.



F. F. FAURE.

Faure was elected to represent the Seine-Inférieure, Oct. 4, 1885, in the Brisson Cabinet; and, for the third time, in 1887, became Under-Secretary of State, this time in the Tirard Cabinet. In the elections of September, 1889, he was elected to represent the second district of Havre, and in the Dupuy cabinet (1894) was Minister of Marine, and was appointed vice-president of the Chamber. On the resignation of Casimir-Perier in January, 1895, Faure was elected as his successor in the Presidency by 430 votes, as against 361 given for Brisson. On July 14, 1896,

an attempt was made to shoot the President at a military review, but it was unsuccessful. His work, *Budgets of France and the Principal Countries of Europe Since 1888*, was commended by the French Academy. Died in Paris, Feb. 16, 1899.

FAUSTIN I, Faustin Elie Soulouque (1785–1867), emperor of Hayti. See Hayti, Vol. XI, p. 546.

FAVIGNANA, the chief of the Ægades, a group of islands in the Mediterranean, off the west coast of Sicily. It is six miles in length and about two in breadth, and lies six miles W. of the Sicilian shore. Wine and wool are produced. The sardine fishery is the main industry. The chief town is San Leonardo. See Ægades, Vol. I, p. 180.

FAVONIA, a genus of *Acalephæ*, or jelly-fishes, belonging to the order of *Discophora*, embracing several characteristic organisms of peculiar structure, such as the *Favonia octenoma* of the South Seas, in which the abnormally elongated proboscis is encircled with eight branching pectinate appendages.

FAVOSITIDÆ, the family of honeycomb corals. The skeleton consists of hollow prismatic columns, pierced by numerous holes and divided by septa into a vertical series of cells. These columns are closely set in more or less hemispherical masses. These corals are characteristic of Carboniferous and Devonian formations.

FAVRE, Jules Claude Gabriel, a French statesman; born in Lyons, March 21, 1809; died in Versailles, Jan. 20, 1880. He became a prominent lawyer and Liberalist in Paris; was for a time Secretary-General of the Interior in the Republican ministry of 1848; strongly opposed Louis Napoleon during the Presidency of the latter, and still more decidedly, under the second empire, opposed the measures which brought on the Franco-German war, but after its commencement supported the national cause. After the fall of Sedan he became Minister of Foreign Affairs in the new republic, and took an important part in the negotiations preceding the treaty of peace with Germany. He retired from the ministry in July, 1871, and devoted himself to law and literature. In 1876 he was returned as Senator for the department of the Rhone. He was a brilliant orator, and the excellence of his literary productions won him a place in the Academy. He was author of *Rome et la République Française* (1871) and *Le Gouvernement du 4 Septembre* (1871–72).

FAVUS or SCALD HEAD. See Medicine, Vol. XV, p. 817; and Parasitism, Vol. XVIII, p. 269.

FAWCETT, Edgar, an American novelist, dramatist and poet; born in New York City, May 26, 1847; graduated at Columbia College in 1867. His works include *Short Poems for Short People* (1871); *Purple and Fine Linen* (1874); *Ellen's Story* (1876); *Fantasy and Passion* (1877); *A Hopeless Case* (1880); *A Gentleman of Leisure* (1881); *An Ambitious Woman* (1883); *Tinkling Cymbals; Adventures of a Widow; Song and Story, Later Poems* (1884); *Rutherford* (1884); *The Buntling Ball* (1884); *Social Silhouettes* (1885); *Romance and Revery* (1886); *The Confessions of Claud; The House at High Bridge; Douglas Duane;* and *The New King Arthur* (1887); *A Man's Will; Olivia Delaplaine;* and *Divided Lives* (1888); *A Demoralizing Marriage; Agnosticism, and Other Essays; Miriam Balestier;* and *Solarian* (1889); *The Evil that Men Do; Fabian Dimitry; A Daughter of Silence;* and *How a Husband Forgave* (1890); *A Romance of Two Brothers; A New York Family; Loaded Dice;* and *Songs of Doubt and Dream* (1891); *Women Must Weep; An Heir to Millions; American Push;* and *The Adopted Daughter* (1892); *The New Hero;* and *A Round Unvarnished Tale* (1893); *Her Fair Fame; A Mild Barbarian;* and *Outrageous Fortune* (1894).

FAWCETT, Henry, an English political economist; born at Salisbury in 1833. He graduated at Cambridge with high honors in 1856, and was elected to a fellowship at Trinity Hall. Two years later he lost the sight of both eyes by the accidental discharge of a gun. In 1863 he became professor of political economy at Cambridge, and in 1865 he entered Parliament as an advanced Liberal. In 1867 he married Miss Millicent Garrett, who has since become well known as a writer and speaker on woman's suffrage. Mr. Fawcett devoted himself in Parliament to the amelioration of the condition of the native races in India, and to the advancement of radical legislation. In 1880 he became Postmaster-General under Mr. Gladstone, and succeeded in greatly improving the condition of the department. He was author of *A Manual of Political Economy* (1863); *The Economic Position of the British Laborer* (1865); *Pauperism* (1871); a volume of *Speeches* (1873); and *Free Trade and Protection* (1878). He died Nov. 6, 1884.

FAWCETT, Millicent Garrett, an English writer; born at Aldeburgh, Suffolk, June 11, 1847; the wife of the late Professor Henry Fawcett. She soon became noted as a leader in the woman's suffrage movement, and also as an advocate of the higher education of girls, in which direction she had the pleasure of seeing her own daughter, Philippa, demonstrate the ability of the sex to attain the highest distinction (see next article). In 1889 Mrs. Fawcett was appointed president of the Women's Unionist Association. She published *Political Economy for Beginners* (1870); *Tales in Political Economy* (1874); *Janet Doncaster: A Novel* (1875); *Some Eminent Women of Our Time* (1889); and, in conjunction with her husband, *Essays and Lectures* (1872). She wrote the article Communism, in this Encyclopædia.

FAWCETT, Philippa Garrett, daughter of Henry and Millicent Garrett Fawcett; born in Cambridge, England, in 1868. She was educated at Clapham High School, at University College, and in 1887 went to Newnham College, Cambridge, with a scholarship. At her graduation in 1890 she was placed in the tripos lists "above the senior wrangler," thus achieving an extraordinary success. The achievement was peculiarly appropriate to the daughter of Professor Fawcett, who had so zealously advocated the higher education of women.

FAY, Theodore Sedgwick, author and diplomat; born in New York city, Feb. 10, 1807. In 1828 he became associate editor of the New York *Mirror*. From 1837 to 1853 he was secretary of the Ameri-

can legation, in Berlin, Germany, and from 1853 to 1861 was minister resident in Bern, Switzerland, his diplomatic positions in the service of the United States covering 25 years. He afterward lived in retirement in Berlin. His works include *Dreams and Reveries of a Quiet Man* (1832); *The Minute-Book* (1835); *Norman Leslie* (1835); *Views of Christianity* (1856); *History of Switzerland* (1860); *Great Outlines of Geography*, an original and invaluable contribution to geographical science (1867); *A History of Germany* (1888); and *Forty Dollars and the Boots, or Shall We Not Abolish Our Apostles' Creed?* (1897). In 1889 a translation appeared in America of his *The Three Germanys, Glimpses into Their History*, a graphic and scholarly work, reflecting vividly the stirring events of which the author was a personal witness. Died in Berlin, Nov. 24, 1898.

FAYAL. See Azores, Vol. III, p. 172.

FAYE, Hervé Auguste Étienne Albans, a French astronomer; born at St. Benoît, Indre, Oct. 5, 1814; studied astronomy with Arago, and in 1843 discovered the comet which bears his name. In 1847 he was elected a member of the Academy of Sciences and received its Lalande prize; became professor of geodesy at the École Polytechnique in 1848; in 1854 rector of the Academy at Nancy; in 1873 inspector-general of scientific instruction; and in 1878 director of the Paris Observatory. He published *Sur l'Anneau de Saturne* (1848); *Sur les Déclinaisons Absolues* (1850); *Des Leçons de Cosmographie* (1852); *Cours d'Astronomie Nautique* (1880); *Sur l'Origine du Monde* (1884). In 1889 he was made grand officer of the Legion of Honor.

FAYERWEATHER, Daniel B., an American philanthropist; born at Stepney, Connecticut, in 1821. At an early age he learned the trade of a shoemaker, and at 34 became a member of a firm of leather dealers in New York city. That move was the beginning of his success, and at the time of his death he represented the largest hide and leather business in New York, if not of the world. He died in New York, Nov. 15, 1890, and left an estate estimated at six million dollars, the bulk of which was bequeathed to various institutions of learning.

FAYETTE, a village of Fayette County, northeastern Iowa, on the Volga River, and on the Chicago, Milwaukee and St. Paul railroad, 58 miles N.W. of Dubuque. It is an agricultural and stock-raising center, and has wagon and carriage factories and creameries. It is the seat of Upper Iowa University, a co-educational Methodist Episcopal institution founded in 1857. It has 22 instructors, 450 pupils, a library of 5,500 volumes and $43,000 in productive funds. Population 1895, 1,173.

FAYETTE, a city and capital of Howard County, north-central Missouri, on the Bonne Femme River, 12 miles from the Missouri River, and on the Missouri, Kansas and Texas railroad. It contains the Howard-Payne College (for women) and Central College (Methodist); has a large flour-mill and other manufactories; in the vicinity are limestone-quarries, coal-fields and sulphur springs. Cattle, wheat and tobacco are shipped from here in large quantities. Population 1890, 2,247.

FAYETTEVILLE, a city and the capital of Washington County, northwestern Arkansas; a delightful summer resort in the Ozark Mountains. It has manufactories of evaporated fruit, flour and wagons, and a large foundry. It has good public schools and the Arkansas Industrial University. Population 1890, 2,942.

FAYETTEVILLE, a village of Onondaga County, central New York, 10 miles E. of Syracuse, on the West Shore railroad. It has flour and paper mills, a machine-shop, glove-factories, a furniture factory, a large corn-canning factory, and manufactures pearl barley, hydraulic cement, quicklime and land-plaster. Population 1890, 1,410.

FAYETTEVILLE, a town and the capital of Cumberland County, south-central North Carolina, on the Cape Fear River, at the head of navigation, and on the Atlantic Coast Line and the Cape Fear and Yadkin Valley railroads, 52 miles S.S.W. of Raleigh. It has a good system of schools, and provides well for the colored race with special schools, the State Normal Colored School being here. Previous to the Civil War, Fayetteville was for a long time the state capital, and was, commercially and in other ways, the most important city in the state. During the Civil War and toward its close, it suffered greatly from invasion and destruction of property. It has a line of steamboats connecting it with Wilmington. It has many manufacturing industries, including carriage and wagon factories, a large roller-mill, besides ice, woodenware and cotton factories. It has all modern city conveniences, electric and gas lights and water-works. Population 1896, over 5,000. See also Fayetteville, Vol. IX, p. 59.

FAYETTEVILLE, a town and the capital of Lincoln County, central southern Tennessee, on the Nashville, Chattanooga and St. Louis railroad, 121 miles S. by E. of Nashville, and on the Elk River. It has manufactories of woolen goods, broadcloths, cassimeres and carriages, and is a shipping-point for corn and cotton. Population 1890, 2,410.

FAYRER, Sir Joseph, an English physician; born at Plymouth, Dec. 6, 1824. He received the degree of M.D. at Edinburgh and at the University of Rome; entered the East India Company's service in 1850 and served in the Burmese war of 1852, during the mutiny of 1857, and at the defense of Lucknow. In 1859 he was appointed professor in the Calcutta Medical College; was president of the Calcutta University, and in 1874 surgeon-general and president of the medical board of the India Office. He was president of the Asiatic Society of Bengal. His publications include *Clinical Surgery in India* (1866); *The Thanatophidia of India*, a description of the venomous snakes of that country (2d ed. 1874); *European Child-Life in Bengal* (1873); *The Royal Tiger of Bengal* (1875); *On the Preservation of Health in India* (1880); and *On the Climate and Fevers of India* (Croonian lectures, 1882).

FAYUM or FAYOUM. See Egypt, Vol. VII, pp. 705, 709, 744.

FAZY, Jean James, a Swiss statesman; born in Geneva, May 17, 1794. He was educated at a Moravian school at Neuwied, studied law and settled in Paris. Here he took an active part in the opposition to the Restoration, and when it became apparent

that a republic could not be established in France, he returned to his native city, where he became a leader in the radical Republican party. In 1846, when the party secured a change of the constitution, Fazy became head of the government, and during the fifteen years that the party continued in power, exerted great influence at Geneva. He retired from public life in 1865. He died in Geneva, Switzerland, Nov. 6, 1878.

FEAR, Cape, the southern extremity of Smiths Island, and of North Carolina, in lat. 33° 52′ 18″ N., long. 77° 58′ 48″ W.

FEAST. See Festival, Vol. IX, p. 113.

FEATHERFOIL, WATER-FEATHER or WATER-VIOLET, common names given to species of *Hottonia*, and so called from the finely divided leaves. The best-known species are *H. inflata* of the United States, and the European species, *H. palustris*. They are curious primulaceous plants, which grow submerged in water and thrust up long scapes above the surface to produce the blossoms.

FEATHER-GRASS, a common name of several grasses with long feathery awns, notably species of the genus *Stipa*. *S. pennata* of Europe is a perennial plant and easy of cultivation. Several species of *Stipa* are natives of the United States, and some of them are known as "weather-grasses," from the twisting and untwisting of their awns under the influence of moisture.

FEATHER RIVER, a river of northern California, a feeder of the Sacramento. It rises in two forks, in Plumas County, in the Sierra Nevada, and has a southerly course of about 250 miles. Large quantities of gold have been found on its bars.

FEATHER-STAR. See Echinodermata, Vol. VII, p. 635.

FEATHERSTONHAUGH, George William, an American traveler and author; born at Havre, France, in 1780. From 1834 to 1835 he made a geological report of part of the Western territories of the United States, and had in view the construction of a geological map of the entire country, but such a project was not entertained by Congress until 1887. He was appointed by the British government as boundary commissioner, under the Ashburton treaty, to settle the northern boundary of the United States. For these services he was made British consul for Calvados and Seine, France. His works include *Geological Report of the Elevated Country between the Missouri and the Red River* (1835); *Geological Reconnaissance in 1835, from Green Bay to Côteau de Prairie* (1836); *Excursion Through the Slave States* (1844); *Canoe Voyage Up the Minnay Sotor* (1847); and *Observations on the Ashburton Treaty* (1842). He died at Havre, France, Sept. 28, 1866.

FEBRICULA or EPHEMERAL FEVER, a fever of short duration and mild character, having no distinct type or specific symptoms by which it can be distinguished or described. Simple treatment, as cooling drinks and sometimes enemas, is generally sufficient to reduce the fever.

FEBRONIANISM. See Hontheim, Johann Nikolas von, Vol. XII, p. 143; and Popedom, Vol. XIX, p. 507.

FECHNER, Gustav Theodor, a German naturalist; born at Gross-Särchen, in Lower Lusatia, April 19, 1801; died Nov. 18, 1887. After studying at Leipsic University, he became professor of physics there in 1834, but was obliged to resign the position five years later on account of trouble with his eyes. He subsequently turned his attention to æsthetics and anthropology. His writings include *Ueber das Höchste Gut* (1842); *Elemente der Psychophysik* (1860); *Ueber die Seelenfrage* (1861); and *Vorschule der Æsthetik* (1876).

FECHTER, Charles Albert, a European actor; born in London, of German-French parentage, Oct. 23, 1824, and educated in France. He made his *début* in 1840, at the Salle Molière, Paris, in a piece called *Le Mari de la Veuve*. His first success came when he played the part of Duval in *La Dame aux Camélias*. Later he appeared in the principal cities of Italy, Germany and England. He was eminently successful in Shakespearean *rôles*, his marvelous and original impersonation of Hamlet ranking among the finest ever witnessed. For some years he was manager of the Lyceum Theatre, London. In 1869 he made a tour through the United States, returning again in 1872, where he remained until his death, which occurred at his farm in Pennsylvania, near Quakertown, Aug. 5, 1879.

FECUNDATION. See Reproduction, Vol. XX, pp. 425–428.

FEDERALIST, a collection of papers first published in the *Independent Journal* of New York City, by Hamilton, Madison and Jay, from October, 1787 until March, 1788. They were 85 in number, and appeared under a joint signature, "A Citizen of New York," at first, afterward "Publius." These papers did much to secure the ratification of the constitution.

FEDERALIST PARTY. When the constitution of the United States had been framed by the convention and sent by the Continental Congress to the states (1787) for ratification or rejection, those who favored its acceptance were called Federalists, and those who opposed it Antifederalists.

After the constitution became "the supreme law of the land," the term *Antifederalist* gradually ceased to have any significance, but the term *Federalist* continued to be used, and was applied to the party in control of the Federal government.

Led by Washington, Adams, Hamilton, Jay, Fisher Ames, Pickering and Morris, it established the machinery of the new government, organized the supreme, circuit and district courts; created the Departments of State, Treasury and War; funded the old Continental Congress debt; assumed and funded the debts of the states caused by the Revolution; made preparation for the payment of the money borrowed from France, Holland and Spain, and in 1791 chartered the first bank of the United States.

Each one of these measures was, of course, attended with opposition, and out of this opposition grew the Republican party, with Jefferson, Madison, Monroe, John Randolph, B. F. Bache, Elbridge Gerry and Albert Gallatin as leaders and organizers.

The Southern and agricultural states, under the lead of Madison, objected to funding the Continental debt at its face value, and resisted the assump-

tion of the state debts on any terms. So strong was the opposition, that, in order to carry these measures, the Federalists were forced to purchase the support of Southern members by consenting to locate the site of the national capital on the banks of the Potomac River. The national debt thus created amounted, in round numbers, to seventy-five million dollars, and was the first great financial measure of the Federalists.

The second was the founding of the Bank of the United States, with a capital of ten million dollars, and power to establish branches in as many cities and towns as the directors thought fit. That Congress had a right to charter a bank was denied by many, because no such power was expressly given by the constitution of the United States. Madison and Jefferson declared there were but two classes of powers: those expressly granted, and those absolutely necessary to carry out the expressly granted powers. Hamilton and Washington and the Federalists added a third class of resultant powers, by which they meant such as could be deduced or implied from the general character of the constitution.

The third part of their financial policy was the system of taxation. They began, in 1789, with duties on imports; but the unforeseen expenses of government, and an Indian war which broke out in Ohio, forced them to increase these as much as they dared, and then gather an internal revenue by taxes on snuff, refined sugar, carriages and domestic distilled whisky.

Each one of these measures had been carried by a strictly sectional vote, and developed so much opposition in the South and in the agricultural sections of the North, that Jefferson and Madison seized the occasion and organized the Republican party.

Though this party sprang from difference of opinion as to the wisdom of certain domestic measures, it was hardly organized when a new cause of opposition was found in the foreign policy of the Federalists. Early in 1793 France declared war on Great Britain, and sent the first minister from the French Republic to the United States, which at that time had no treaty with Great Britain, and was bound by a treaty of alliance with France. Construing this to be a defensive treaty, Washington issued his proclamation of neutrality, and drove hosts of voters into the Republican ranks.

In Congress the Republicans, who now commanded a small majority in the House of Representatives, attempted (1794) to carry through measures hostile to England, which so alarmed Washington, that, with the approval of the Senate, John Jay was sent to London to negotiate a treaty of amity and commerce. This famous treaty was sent to the Senate in June, 1795; was ratified by a vote of 20 to 10; was publicly burned by the Republicans all over the land, and brought upon Washington the most violent abuse.

As he would not accept a third term, the Presidential election of 1796 was contested for the first time. No formal nomination was made, but it was known that Jefferson and Burr were the choice of the Republicans, and John Adams and Thomas Pinckney of the Federalists. The Twelfth Amendment did not exist and Adams having received 71 votes and Jefferson 68, they became, respectively, President and Vice-President.

Scarcely had they been inaugurated when the French Directory, angry at the ratification of Jay's treaty, refused to receive C. C. Pinckney as minister from the United States, and expelled him from France. When, in the interest of peace, a special mission of three envoys (John Marshall, Elbridge Gerry and C. C. Pinckney) was sent, they, too, were dismissed.

So devoted was the Republican party to the cause of France, that, in spite of this treatment, the Federalists were unable to carry a bill to arm American vessels. Indeed, it was not till the Senate ordered the dispatches of the envoys to be published that the popular indignation was aroused. From these dispatches it appeared that, on reaching Paris, the Americans had been approached by agents of the Directory and told that before they could be received they must pay each of the five Directors $50,000, and promise to make a loan to France. When this was known, the outburst of popular wrath swept away all opposition and left the Federalists in full control. Using their new power, they (1798) suspended the French treaties; created the Navy Department; gathered a navy; ordered a provisional army to be raised; passed the Alien and Sedition laws, and from 1798 to 1800 carried on a naval warfare against France, in which privateers, armed merchantmen and naval vessels took part.

The elections of 1798 gave the Federalists a majority in the Seventh Congress (1799–1801); but their career was run. The tremendous stretch of power involved in the passage of the Alien and Sedition laws the vigorous prosecution, under the Sedition law, of the editors of Republican newspapers, and the rapid decline of the excitement over the conduct of France, turned the tide, and in 1800 the Republicans defeated John Adams and C. C. Pinckney, the Federalist candidates, and elected Thomas Jefferson and Aaron Burr President and Vice-President.

Thus driven from the control of national affairs, the Federalist party rapidly declined. In 1804 it carried but two states (Connecticut and Delaware) and two electors in Maryland.

Hatred of the embargo (1807–09) enabled them to carry five states in 1808, which the bitter opposition to the War of 1812–15 increased to seven in 1812; but the number of Federalist states fell to three in 1816, after which the party ceased to nominate Presidential candidates, and disappeared utterly from national political history.

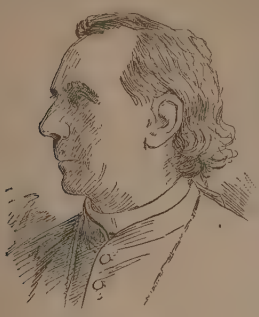
J. B. McMaster.

FEDERALIST THEOLOGY. See Theology, Vol. XXIII, p. 268; Cocceius, Vol. VI, p. 91.

FEDERALSBURG, a village of Caroline County, eastern Maryland, on Nanticoke River, and on the Philadelphia, Wilmington and Baltimore railroad, in the center of the great peach peninsula. Fruit-raising and the making of fruit-baskets are the chief occupations. Population 1896, about 800.

FEDERATION OF LABOR, American. See Labor Organizations, in these Supplements.

FEEHAN, Patrick A., an American Catholic prelate; born at Killenaul, County Tipperary, Ireland, Aug. 29, 1829. Entering Castle Knock College at the age of 16 years, he studied there for two years and then entered Maynooth College, where he studied philosophy and theology for five years, and where, upon his graduation, he was offered a professorship. Emigrating to America in 1852 he entered the Ecclesiastical Seminary at Carondelet, where he was ordained priest November 1st of that year. He labored as priest and teacher for 12 years under Archbishop Kendrick of the see of St. Louis, becoming professor of moral theology and sacred scripture in the Seminary of Carondelet. He became bishop of the see of Nashville in 1865, and found that diocese almost completely demoralized and deeply in debt as a result of the war. Despite the great yellow-fever epidemic that swept over the diocese at the very beginning of his incumbency, he rehabilitated and wonderfully developed the see of Nashville, showing such remarkable ability as far surpassed even the expectations of those on whose recommendation he had been assigned to that diocese, and it was in recognition of this that he was appointed the first archbishop of the arch-diocese of Chicago, in 1880.



ARCHBISHOP FEEHAN.

FEELING, Mental. See Psychology, Vol. XX, pp. 66–75.

FEIA, a large lake of Brazil, about twenty miles long and with an area of 190 square miles, 130 miles N.E. of Rio Janeiro, near the Atlantic, with which it communicates by an artificial canal called Furado. It is very shallow, and the Macabú and other small streams flow into it. It is well stocked with fish.

FEIJÓ, Diogo Antonio, a Brazilian priest and statesman; born at São Paulo, Aug. 10, 1784, and ordained a priest in 1807. He was sent as a representative to the Portuguese Assembly in 1822, and there made an impassioned speech in favor of Brazilian independence, but the plea was unsuccessful, and he and five others left secretly for Falmouth, where they issued a manifesto justifying their views. Feijó returned to Brazil, but refused to accept Dom Pedro's project of a constitution. His native province elected him to the Legislature for two terms (1826–33). In 1827 he proposed the abolition of celibacy among the clergy, and in 1831 was Minister of Justice, in which capacity he suppressed two revolts. In 1833 he was made life Senator, and the following year was elected regent of Brazil during the minority of Dom Pedro II. He resigned in 1837. He died at São Paulo, Nov. 10, 1843.

FELANICHE or FELANITX, a town on the Spanish island of Majorca. On a neighboring hill is an ancient Moorish castle, with subterranean vaults. The town is actively engaged in fruit-raising and making wines and brandies. Population, 11,800.

FELCH, Alpheus, an American statesman; born at Limerick, Maine, Sept. 28, 1806. His grandfather, Abijah Felch, was a soldier in the Revolution. Alpheus was graduated at Bowdoin in 1827, and was admitted to the bar at Bangor, Maine, in 1840. In 1833 he went to Monroe, and in 1843 to Ann Arbor, Michigan. He was elected to the state legislature in 1836; was bank commissioner in 1838–39; auditor-general for some months in 1842; judge of the supreme court of the state from 1842 to 1845; resigned to become governor in 1846–47 and was elected United States Senator, as a Democrat, in 1847, retaining his seat until 1853. From 1853 until 1856 he was president of the Guadelupe Hidalgo Land Commission, and professor of law in the University of Michigan from 1879 to 1883. He died at Ann Arbor, June 13, 1896.

FELDSPAR or FELSPAR. See Geology, Vol. X, p. 227; and Mineralogy, Vol. XVI, p. 418.

FÉLIBRES (*Expositors*), lovers of ancient Provençal literature, who have done much, since their first organization in 1835, toward restoring the masterpieces of this most poetical language, which was undoubtedly at the head of European *belles-lettres* in the thirteenth and fourteenth centuries. To those ancient poems of the troubadours the modern Félibres have added some admirable productions of their own, due to the pens of Joseph Roumanille, Frédéric Mistral, Aubanel, Camille Reybaud, and others. The Félibrige, or the society composed of the Félibres, has its headquarters at Avignon, with branches in various parts of France, Spain and northern Italy. They foster the study of Provençal literature, publish an almanac, *Armana Prouvençau*, and a periodical, issued by one of the societies, entitled *Revue des Langues Romanes*, established in 1870. See also Mistral, in these Supplements.

FELICITAS, Saint, a Roman matron martyred with her seven sons, A.D. 164, under Marcus Aurelius, because they refused to worship idols. St. Felicitas is commemorated in the Roman martyrology on the 23d of November, and the sons on the 10th of July, on which day their festival occurs. A woman of the same name suffered death with Saint Perpetua, A.D. 211, also for refusing to offer sacrifices to idols.

FELLAH. See Egypt, Vol. VII, p. 723.

FELLAHIEH or DORAK, a thriving manufacturing town in the province of Khoristan, southwestern Persia. By a canal uniting the river Dorak with the river Karun, considerable trade is carried on. Population, about 8,000.

FELLATAS or FOULAHS. See Africa, Vol. I, p. 263.

FELLOW-SERVANTS, those who are engaged in the same service for the same employer. The general rule of law, is that one who is employed by another in a specified line of duty assumes the risks and perils which are necessarily incident to that employment, and if injured as a consequence of such risks and perils, the employer is, ordinarily, not answerable for such injury. The perils and risks resulting from the carelessness or negligence of a fellow-servant are among those assumed by an em-

ployee. The rule as to fellow-servants was first applied in England in 1837, and its first application in the United States was made by the court of appeals of South Carolina in 1841, but before the decision of the English court was known there. Since that time the courts of the various states have almost universally followed the rule. The difficulty has been to determine properly when the rule applies. The reason for the rule seems to be, that when several persons are employed in a common enterprise, or in a common line of work, and the safety of each person so employed depends in a certain degree upon the care and attention which his fellow-workmen give to their duties, all the persons so employed are usually in a position to observe the conduct of the others, and if proper skill is not shown, may report such misconduct to their employer, and if the employer will not take the necessary precautions, by employing skillful and competent workmen, may leave his service. It is considered by the courts that, for these reasons, justice will be done to a greater extent by requiring workmen to assume the risk of injury by reason of the neglect of fellow-workmen than by permitting them to resort to the common employer for indemnity. See EMPLOYERS' AND EMPLOYEES' LIABILITY, in these Supplements.

FELLOWSHIP, an ancient institution in European colleges and universities, and of recent adoption in educational institutions in America. In the universities of Cambridge and Oxford a fellow is chosen from among the post-graduate students on account of special ability in some line of investigation. The fellowship carries with it certain privileges in the choice of rooms in the college buildings, a share in the government of the institution, and certain duties, such as assisting in the work of instruction and in the discipline of the undergraduates. Fellowships are of two classes—resident and traveling. The traveling-fellowship permits its holder to study at some other British institution, or, more generally, at some Continental university. A fellowship of either class presupposes that all work during the continuance of the special term for which it is granted is to be done along one line. In England, fellowships are granted for one, two, or three years, or for life. All the expenses of the holder are paid from either the income of a special endowment or from the university general funds. In the United States, fellowships have been endowed by private means, to promote research along certain lines of study. Nominally, it is required of the fellow that he devote a portion of his time to giving instruction, and, in a few instances, as at Princeton College, that he take charge of a section of the dormitories. There are traveling-fellowships in connection with all the higher schools. Among the institutions for men offering fellowships are Johns Hopkins, Harvard, Princeton, Cornell and the University of Chicago; among those for women, Bryn Mawr, Vassar and Wellesley. No one is eligible to a fellowship who has not been granted a master's degree. There are, in the United States, organizations of women, of which the Association of Collegiate Alumnæ is the principal, for aiding young women in securing higher education. Several of these organizations have collected funds, from the income of which they have established traveling European fellowships, to enable young women to secure the advantages of the European universities. These organizations are generally independent of any educational institution.

FELON. See WHITLOW, Vol. XXIV, p. 554.

FELSTONE OR FELSITE. See GRANITE, Vol. XI, p. 49.

FELTON, CORNELIUS CONWAY, an American educator; born in West Newbury, Massachusetts, Nov. 6, 1807; graduated at Harvard in 1827; in 1834 received the Eliot professorship of Greek literature, and later becoming a regent of the university. In 1853–54 he visited Europe and studied modern Greek, and in 1858 made a second visit. In 1860 he was chosen president of Harvard, continuing in office till the time of his death. He was also one of the regents of the Smithsonian Institution. President Felton made several translations, including Menzel's *History of German Literature* (1840); and Arnold Guyot's *Earth and Man* (1849). Among his more important works are *Iliad of Homer*, with Flaxman's illustrations, which went through many editions (1833); *The Clouds of Aristophanes* (1841); *The Panegyricus of Isocrates* (1847); *The Agamemnon of Æschylus*, which gave rise to great controversy (1847); *The Birds of Aristophanes* (1852); *Familiar Letters from Europe* (1865); *Greece, Ancient and Modern* (published posthumously, 1877). He died at Chester, Pennsylvania, Feb. 26, 1862.

FELTON, SAMUEL MORSE, an American civil engineer, brother of the preceding; born at West Newbury, Massachusetts, July 17, 1809; graduated at Harvard in 1834; studied civil-engineering; appointed, in 1843, superintendent and engineer of the Fitchburg railroad, and was president of the Philadelphia, Wilmington and Baltimore railroad from 1851 until 1865. In this position he received information of a plot to capture President Lincoln on his way from Harrisburg to his inaugural at Washington in 1861. The plot included the capture of the capital, the cutting of the telegraph wires, and the prevention of the approach of troops to Washington from the North. Mr. Felton organized guards in the guise of workmen, provided a secret police force, and by delaying an ordinary train for the dispatch of an "important package" conveyed the President in safety to his destination. When communication by way of Baltimore was cut off from Annapolis, Mr. Felton planned the transportation of troops by steamer to Havre de Grace. He died in 1890.

FELUCCA, a vessel used in the Mediterranean, propelled by from 16 to 24 oars, and rigged with two lateen sails. It has frequently a rudder at each end, to be applied as occasion demands. During the wars between France and England, feluccas were armed with a heavy gun or two, and sent out as gunboats against the English ships.

FEMERN OR FEHMARN, an island in the Baltic, belonging to the Prussian province of Schleswig-Holstein, 10 miles N.E. of Oldenburg. It has an area of 71 square miles, is flat, fertile and well cultivated, but has an unhealthful climate. Agriculture, fishing and stocking-weaving form the prin-

cipal employments of the inhabitants. Population, 9,800.

FEMUR. See ANATOMY, Vol. I, p. 829.

FENCES, LAW OF. Under the common law, land-owners were not obliged to erect fences inclosing land for the purpose of preventing roaming cattle from trespassing, but might rely upon an action for damages against the owner of the trespassing animals. This rule is followed in some states of the United States, but in others, by statute, all land must be inclosed before damages can be recovered from the owner of stock which has injured another's premises. In most states the duty is imposed upon railroad companies to maintain fences along their lines, and in the absence of a compliance therewith, they are liable for any destruction of stock which they may cause. In many states the subject of division or partition fences is regulated by statutes. In such states the owners of adjacent tracts of land are bound to erect and maintain one half of a suitable fence along the line separating such tracts. In some states, fence-viewers or other officers are provided for to determine the just share of each party liable to maintain a partition-fence, and suitable methods are provided for enforcing their adjudications.

FENESTELLA OR FENESTRELLA, a genus of fossil polyzoa having the polypes arranged in a network or lacework. This is the type of a family which ranged from the Lower Silurian to the Permian.

FENIANISM. See IRELAND, Vol. XIII, p. 271; and HOME RULE, in these Supplements.

FENN, GEORGE MANVILLE, an English novelist; born in Westminster, Jan. 3, 1831; became a master in a country school; entered into business as a printer; issued a magazine in 1862, and was associated in the proprietorship of a provincial newspaper in 1864. He contributed short stories to *All the Year Round*, *Chambers's Journal*, *Once a Week*, and to a London evening newspaper, *The Star*, then edited by Justin McCarthy, for which he also wrote a series of articles, entitled *Readings by Starlight*, published in collected form in 1867. In 1870 he became editor of *Cassell's Magazine*. Of his works, including novels, boys' stories, adventures, sketches, and plays, the following may be named: *Webs in the Way* (1867); *The Sapphire Cross* (1871); *The Parson of Dumford* (1879); *Off to the Wilds* (1881); *Nat the Naturalist* (1883); *The Rosery Folk* (1884); *The Silver Cañon* (1884); *A Double Knot* (1890); *Cutlas and Cudgel* (1890); *The Grand Chaco* (1892); *In an Alpine Valley* (1893); *Blue Jackets* (1893); *High Play* (1898); *A Woman Worth Winning* (1898); *Nic Revel* (1898); *Draw Swords* (1898); and *The Silver Salvers* (1898). His works have had much popularity in America.

FENNEC OR ZERDA (*Vulpes zerda*), one of the foxes found on the sandy plains of Africa. The animal is small, has large ears and blue eyes. It digs burrows in the sand. The zerdas are often tamed and kept as pets.

FENTON, a village of Genesee County, southeastern central Michigan, 50 miles N.W. of Detroit, on the Detroit, Grand Haven and Milwaukee railroad. It contains a flour-mill, foundry, woolen factory, a cooperage and a Baptist seminary; its industries also include grain, fruit and stock-raising. Population 1895, 2,387.

FENTON, REUBEN EATON, an American statesman; born at Carroll, New York, July 4, 1819; began the practice of law in Jamestown, New York, in 1841, and in 1843–51 was supervisor of the town of Carroll. In 1852 he was elected to Congress as a Democrat, but was defeated two years later on account of his vote in Congress on the Kansas-Nebraska Bill against the extension of slavery. In 1856 he was elected as a Republican, and served from 1857 to 1864, when he resigned to become governor of his state. He received a gubernatorial re-election, and from 1869 to 1875 was a United States Senator. He died Aug. 25, 1885.

FENWICK, BENEDICT JOSEPH, an American Roman Catholic bishop; born in St. Mary's County, Maryland, in September, 1782; educated at Georgetown College and in the seminary of St. Sulpice, at Baltimore; ordained in 1808; stationed in New York City, where he founded the New York Literary Institute and began the erection of St. Patrick's Cathedral, from plans prepared by himself. In 1816 he was made vicar-general. The following year he was made president of Georgetown College; in 1822 procurator-general of the Jesuits in the United States, and in 1825 became bishop of Boston. In 1843 he founded the College of the Holy Cross at Worcester, Massachusetts, and placed it in charge of the Jesuits. His diocese extended over the whole of New England, and he left it with fifty churches, an orphan asylum and many schools. He died at Boston, Aug. 11, 1846.

FENWICK, EDWARD D., an American Roman Catholic bishop; born in St. Mary's County, Maryland, in 1768; educated at the College of Bornheim, in Belgium, and after ordination became a professor in the college. He was driven from Belgium by the French revolutionists, and returned to America. Having become a Dominican in Belgium, and being desirous of founding a province of the order, he went to Kentucky in 1806, where he bought a farm and built the convent of St. Rose of Lima. He resigned the office of provincial later, became a missionary in Ohio, and built the first church in Cincinnati in 1819. He was made bishop of the diocese in 1822. He died at Wooster, Ohio, Sept. 26, 1832.

FENYES, ELEK, a Hungarian geographer and statistical author; born in Csokaj, in the county of Bihar, in 1807. He traveled over the country, and thoroughly acquainted himself with the state of the Hungarian kingdom, of which there had never before been an authentic survey. The first-fruits of his enterprise appeared in 1840, under the title, *Hungary and Its Annexed Parts, Geographically and Statistically Considered.* He was awarded the great prize of 200 ducats by the Hungarian Academy. Among his other works are *The Statistics of Hungary* (1843); *General Atlas for Hungary* (1845); *Description of Hungary* (1847); *Geographical Dictionary of Hungary* (1851). All of his works are written in the Magyar tongue, and some of them have been translated into German, and repeatedly published.

They form invaluable stories, both for the historian and linguist. During the national government of Hungary in 1848 Fenyes was chief of the Statistical Bureau.

FERÆ NATURÆ, a term used to designate that class of animals which have not been domesticated, and are, therefore, not the subject of personal property. Such animals belong to a person only during such time as he has possession of them. The owner of land has a qualified property of this class of animals during the time, by reason of their immature age, they are not able to leave.

FER DE LANCE (*Craspedocephalus lanceolatus*), a venomous serpent of the West Indies. The name, signifying lance-iron, refers to peculiar markings on the head. The bite is often fatal, and even if the victim survives, serious results last for years.

FERDINAND I, Prince of Bulgaria, Duke of Saxe; born in Vienna, Austria, Feb. 26, 1861, the youngest son of Prince August of Saxe-Coburg-Gotha, and his wife, Clementine, Princess of Bourbon-Orleans. He was chosen prince of Bulgaria by the Grand National Assembly at Tirnova, July 7, 1887, and, although his election was not confirmed or assented to by the Sublime Porte or by the Treaty Powers, he subscribed to the constitution and took up the reins of government, under the title of Ferdinand I, at Tirnova, Aug. 14, 1887. He married, April 8, 1893, at Villa Pianore, Florence, Italy, Marie Louise Pie Thérèse Anne Ferdinande Françoise Antoinette Marguerite Josephine Caroline Blanche Lucie Apollonie de Bourbon, Princess of Parma, daughter of Robert Charles, Duke of Parma, by whom he had two children, the heir apparent to the Bulgarian throne, Prince Boris of Tirnova, born in the palace of Sofia, Jan. 18, 1894, and Cyril, Prince of Preslav, born in Sofia, Nov. 5, 1895. Prince Ferdinand's rule was marked by a policy of *rapprochement* with Russia. While the history of his reign will be found under the more appropriate heading of Bulgaria (q.v., in these Supplements), his embracing the faith of the orthodox Russian Church in lieu of the tenets of the Catholic faith, and his decision, in 1896, to bring up his son, Prince Boris, in the faith of the Russian Church, are here worthy of mention. He played what has been deemed a discreditable part in the assassination of his ex-premier, Stambuloff (q.v., in these Supplements), and was but a tool in the hands of Muscovite diplomats, paving the way for the advance of their ruler toward the shores of the Golden Horn.

FERDINAND I.

FERGUS FALLS, a city and the capital of Otter-tail County, central western Minnesota, on the Little Red River, and on the Great Northern and Northern Pacific railroads. It has good water-power, and flour and paper mills. It has a state high school and a Norwegian Lutheran college. Population 1895, 4,497.

FERGUSON, James, an American astronomer born in Perthshire, Scotland, Aug. 31, 1797; went to the United States in 1800; studied civil-engineering; was appointed to assist in determining the boundary between the United States and Canada under the treaty of Ghent (1819–22); from 1822 until 1827 was astronomical surveyor to the Boundary Commission; civil engineer to the state of Pennsylvania in 1827–32; first assistant to the United States Coast Survey in 1833–47, and assistant astronomer to the United States Naval Observatory in 1847–67. While holding the last-named position he discovered three new asteroids: No. 31, *Euphrosyne* (Sept. 1, 1854); No. 50, *Virginia* (Oct. 4, 1857); and No. 60, *Echo* (Sept. 15, 1860). He was the first American to add to the number of the small planets discovered, and was awarded twice, by the French Academy of Sciences, Ferguson prize medals. He died in Washington, Sept. 26, 1867.

FERGUSON, Sir Samuel, an Irish poet and Celtic scholar; born in Belfast, Ireland, in 1810; died in 1886. He was educated at Trinity College, Dublin; called to the bar in 1838, and in 1859 was made queen's counsel. He gave much attention to Irish antiquities, and as president of the Royal Irish Academy gave a powerful impetus to the scientific study of early Irish art. As a member of the Young Ireland party, he formed the Protestant Repeal Association, to reinforce the demand for home rule made by the Roman Catholics, and thus make the movement more national. His contributions to the magazines began to attract attention about 1832. He published *Lays of the Western Gael* (1865); *Congal: A Poem in Five Books* (1872); *Poems* (1880); and *The Forging of the Anchor* (1883). He was appointed deputy keeper of the Irish Rolls in 1867, and in recognition of his services to Celtic literature was knighted in 1878.

FERGUSSON, James, a Scottish architect; born at Ayr in 1808; died Jan. 9, 1886. He was educated at the high school of Edinburgh, and after spending some years as an indigo-planter in Bengal, engaged in extensive explorations of India, sketching and studying the rock temples. In 1859 he was appointed a member of a royal commission on the defenses of Great Britain. His later works include *Illustrations of the Rock-cut Temples of India* (1845); *The Palaces of Nineveh and Persepolis Restored* (1851); *Hand-book of Architecture* (1855); *History of the Modern Styles of Architecture* (1862); *History of Ancient and Modern Architecture* (1868); *Tree and Serpent Worship* (1869); *History of Rude Stone Monuments* (1872); *The Temples of the Jews and Other Buildings in the Haram Area at Jerusalem* (1878). The chief features of his earlier works were embodied in *Cave Temples of India* (1880). His works on architecture are regarded as standard authority. He became, also, an authority on the construction of fortifications. His recommendation of presenting round instead of salient angles to the enemy's artillery has been adopted.

FERIÆ, in Roman antiquities, were holidays, during which all free Romans suspended their business and their political and legal doings, and when slaves were allowed a rest from their labors. These

celebrations were private or public. The former were celebrated by individual families or persons to commemorate some particular family or personal event. The public feriæ included the several days on which religious festivals of a public character were held. The precise dates were fixed by the magistrates, or other officials, with special reference to some exigency. The manner of holding these feriæ bore some analogy to the celebration of the Sabbath in later times. The name is still preserved in the Roman Catholic Church, and refers to a week-day wherein no specific religious service is appointed.

FERLAND, Jean Anton Baptiste, a Canadian clergyman and author; born in Montreal, Dec. 25, 1805; died in Quebec, Jan. 8, 1864. He was ordained priest in 1828, and in the same year was named vicar of Quebec. In 1841 he became professor in the seminary of Nicolet, and seven years later was elected superior. In 1850 he became a member of the archbishop's privy council. In 1855 he was made chaplain of the military hospitals of Quebec, and the same year professor at Laval University. In 1864 he was elected dean of the faculty of arts in that university. His chief work was his *Cours d'Histoire du Canada*, the first volume of which appeared in 1864. He also published accounts of his voyages to Labrador and the coast of Gaspé.

FERNANDEZ DE CASTRO, Manuel, a Spanish geologist; born in Madrid, Dec. 25, 1825; graduated at the School of Mines, Madrid. He became a subdirector of a mine at Almaden and traveled abroad, studying the various railway systems, and on his return, published, at the expense of the government, a work on railways, in which he recommended a new system of signals, which was adopted. He was afterward employed on government mining and geological surveys in Cuba and Santo Domingo. He was appointed, in 1869, a professor in the Madrid School of Mines, and in 1873 took charge of the work of producing the geological map of Spain, an extended series of reports and maps being issued in connection therewith under his supervision. He was elected, in 1879, to represent the Cuban province of Santa Clara in the Spanish Senate.

FERNANDEZ DE PIEDRAHITA Lucas, a New Granadan prelate; born in Bogotá in 1624; died in Panama in 1688. On his mother's side he was descended from the Incas of Peru. He became a favorite preacher and vicar-general and governor of the archbishopric of Bogotá. In 1663 he went to Spain to write a *Historia del Nuevo Reyno de Granada.*

FERNANDINA, a port of entry in northeastern Florida, and county seat of Nassau County, on the west side of Amelia Island, between Prince William and Nassau Sounds, Amelia River and the Atlantic. It affords good anchorage, has a lighthouse, large foreign and coast trade in cotton and naval stores, besides manufactories for creosoting lumber and piling, and for making superior plastering-fiber from raw palmetto. A steamboat line connects the port with New York. Population 1890, 2,803.

FERNANDO PO, a volcanic island in the northeastern part of the Gulf of Guinea. It was discovered in 1741 by a Portuguese sailor, whose name it received, and was ceded, a few years later, to Spain. It has dense forests, luxuriant vegetation and picturesque scenery, and exports India rubber and palm-oil. Area, 850 square miles; population, 30,000, chiefly native Aniyos (or "Boobies," as they are called), a negro tribe with coarse, repulsive features, of hostile manner and degraded habits.

FERN, Fanny. See Parton, Sarah Payton, in these Supplements.

FERN, Sweet, a shrub of the family *Myricaceæ*, a native of North America, chiefly in the East, in sterile, rocky soil, and forming a small bush with fern-like leaves. Its leaves have a powerful aromatic fragrance when rubbed. It is tonic and astringent, and much used in the United States as a domestic remedy for diarrhœa.

FERNOW, Bernhard Edward, an American arboriculturist; born at Inowrazlaw, in Prussia; studied forestry at the University of Königsberg; entered the government forestry service; served through the Franco-Prussian war, and emigrated to the United States in 1876, where he was engaged in the management of Pennsylvania timber-lands from 1884 to 1886, when he became head of the forestry department of the Bureau of Agriculture. He was secretary of the American Forestry Association for a number of years.

FERONIA, an Italian goddess, especially honored among the Sabines. Little is known concerning the myth, and she has been variously regarded by commentators as goddess of commerce, of liberty, and as the goddess who presided over the woods and groves.

FEROZABAD or FIROSABAD, a town of British India, 24 miles E. of Agra. It is surrounded by a wall, outside of which are many mounds and interesting ruins. Population, 16,023.

FERRACUTE SOLDERING-TABLE. See Can-Manufacture, in these Supplements.

FERRAR, Nicholas, an English religious exemplar; born in London in 1592; entered Clare Hall, Cambridge, at the age of 14; graduated and obtained a fellowship in 1610. He studied medicine, but owing to ill health traveled abroad in 1613–18. On his return he entered the office of his father, a London merchant, who was closely identified with the Virginia Company. Ferrar was returned to Parliament in 1624, but retired, the following year, to Little Gidding, in Huntingdonshire, where he founded the religious community which became known, on account of the asceticism there practiced, as the "Arminian Nunnery." In 1626 he was ordained a deacon by Laud. The community consisted, at the start, of himself and mother, his sister, brother and brother-in-law, their wives and families, numbering about forty souls. The members engaged themselves in constant religious services, including nightly watches and devotions. They also employed themselves in the craft of fine bookbinding. The establishment was visited twice by Charles II, in 1633 and in 1642. Ten years after the death of its founder the house was broken up by the Cromwellian Puritans, who looked with suspicion on a form of asceticism which did not seem to concern itself with political affairs.

See *Life of Nicholas Ferrar*, by Rev. John Eyton Bickersteth Mayor (1855). He died Dec. 4, 1637.

FERRARI, GIUSEPPE, an Italian historian and philosopher; born in Milan in 1811; studied law at Pavia, but was attracted to literature, and edited a complete edition of the works of Giovanni Battista Vico (1834). He removed to Paris in 1837, where he published, two years later, *Vico and Italy*, and was appointed, in 1840, professor of philosophy at Rochefort. He occupied the chair of philosophy at Strasburg for some years, being removed twice on account of his communistic ideas. In 1847 he published an essay on the *Principles and Limits of the Philosophy of History*. In 1859 he returned to his native country and filled chairs at Turin, Milan and Florence. His other works include *Filosofia della Rivoluzione* (1851); *Histoire des Révolutions d'Italie* (1856); *Corso di Lezioni sugli Scrittori Politici Italiani* (1862). He died July 1, 1876.

FERRARI, PAOLO, an Italian dramatic poet; born at Modena, April 15, 1832; was appointed professor of history at Modena in 1860, and afterward at Milan. He is best known by his comedies, *Goldoni e le Sue Sedici Commedie* (1852) and *Parini e la Satira* (1857). He died at Milan, March 10, 1889.

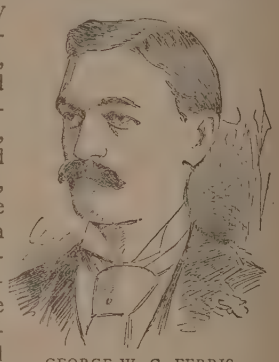
FERREIRA, ALEXANDRE RODRIGUES, a Portuguese naturalist; born in Bahia, April 27, 1756; died in Lisbon, Portugal, April 23, 1815. He studied at Coimbra, and in 1770 became professor of natural history in that university. In 1778 the government of Portugal appointed him to make researches into the natural history and geography of the country bordering the Amazon River, but it was not until 1783 that he was enabled to engage in the Brazilian exploration. In 1792 the explorer returned to Belem, and a year later went to Lisbon. In Portugal he became connected with the Ministry of Marine, and in 1796 was made superintendent of the Royal Cabinet of Natural History and of the Botanical Gardens.

FERREL, WILLIAM, an American meteorologist; born in Fulton County, Pennsylvania, Jan. 29, 1817; graduated at Bethany College in 1844; and in 1857 was appointed assistant in the government office of the *American Ephemeris and Nautical Almanac*, continuing in this position for ten years, when he was employed on the Coast Survey of the United States, to investigate the subject of tidal waves. In 1882 he became professor in the Signal Service, and retired from this position in 1886. His publications include *Motions of Fluids and Solids Relative to the Earth's Surface* (1859); *Determinations of the Moon's Mass from Tidal Observations* (1871); *Tidal Researches* (1874); *Tides of Tahiti* (1874); *Meteorological Researches* (1875, 1878, 1881); *Temperature of the Atmosphere and the Earth's Surface* (1884). He invented a tide-predicting machine, which came into general use. He died at Maywood, Kansas, Sept. 18, 1891.

FERRICYANIDES. See PRUSSIC ACID, Vol. XX, p. 24.

FERRIER, DAVID, a Scotch neurologist; born at Aberdeen, in 1843; graduated at the university of that city, with high honors, in 1863; gained, the same year, the Fergusson scholarship in classics and philosophy, open to students of the four Scottish universities. He studied philosophy in Heidelberg; and medicine in Edinburgh, graduating in 1870. In 1872 he was appointed professor of forensic medicine in King's College, London; and, in 1889, was inducted into the chair of neuropathology, which had been specially provided for him by the governing body of the college. He received many medals for his researches on the brain. Dr. Ferrier's researches have increased our knowledge of the brain perhaps more than those of any other investigator. A prominent advocate of vivisection, he incurred the special hostility of the anti-vivisectionists in connection with his operations on living animals, including apes. His original researches were mostly conducted, at first, at the West Riding Asylum (see CRICHTON-BROWNE, SIR JAMES, in these Supplements). Dr. Ferrier is one of the editors of *Brain*, and has published *The Functions of the Brain* (1876); *The Localization of Cerebral Diseases* (1878); *Lesions of the Regions of the Cerebral Hemispheres* (1885).

FERRIS, GEORGE WASHINGTON GALE, an American engineer; born at Galesburg, Ill., Feb. 4, 1859. Migrating with his family to California, he there received his early education, and in 1881 graduated from the Rensselaer Polytechnic Institute, Troy, New York. He started in business at Pittsburg, Pennsylvania, where he located his construction works. When the Columbian Exposition structures were building, some special structure was desired that should rival and excel the Eiffel Tower of the Paris Exhibition of 1889. At a dinner of the Saturday Afternoon Club Mr. Ferris outlined the plan of a monster wheel of a design all engineers had declared impracticable. The plan then outlined was successfully carried out. Died in Pittsburg, Pa., Nov. 22, 1896. See FERRIS WHEEL, *post*, p. 1261.



GEORGE W. G. FERRIS.

FERRIS, ISAAC, an American clergyman; born in New York City, Oct. 9, 1798. His course at Columbia College was interrupted by his raising, among the students, a military company for the War of 1812, but he was graduated with honors in 1816. He studied theology at Rutgers College; was licensed to preach in 1820; next year became pastor of the Reformed Dutch Church at New Brunswick, New Jersey, and subsequently held pastorates in Albany and New York City. He was long the principal of Rutgers Female Institute, and in 1852 became chancellor of the University of New York. His administration originated marked improvement in the standard of scholarship, while his management of the funds relieved the financial embarrassment. He occupied the chair of moral science and Christian evidence in 1853–70, and was acting professor of constitutional and international law in 1855–69. He died at Roselle, New Jersey, June 16, 1873.

FERRIS WHEEL, The, an immense structure designed and invented by G. W. G. Ferris (q.v., in these Supplements) as a popular feature in the Midway Plaisance at the World's Columbian Exposition, held in Chicago in 1893. The wheel was composed of two wheels of the same size, connected and held together by rods and struts, which, however, did not approach closer than 20 feet to the periphery. Each wheel had for its outline a curved, hollow, square iron beam 25½ by 19 inches. At a distance of 40 feet within this circle was another circle of a lighter beam. These beams were called "crowns," and were connected and held together by an elaborate truss-work. At the center of the wheel was an immense axle, 32 inches thick and 45 feet in length. Each of the twin wheels, where the axle passed through it, was provided with a large iron hub 16 feet in diameter. Between these hubs and the inner "crowns" there were no connections, except spoke-rods 2½ inches in diameter, arranged in pairs and 13 feet apart at the crown connection. At a distance these looked like spiders' webs, and the wheel appeared to be constructed on the principle of a bicycle wheel, the only difference being that it hung by its axle instead of resting on the ground. On the periphery of the wheel, and at equal intervals, were hung 36 cars, or carriages, for the conveyance of passengers. Each car was 27 feet long, 13 feet wide and 9 feet high, and had a carrying capacity of 40 passengers. The wheel, with cars and passengers, weighed 1,200 tons, and needed substantial support. The axle rested on two skeleton iron towers, each 40 by 50 feet at the base, 6 feet square at the top and 140 feet high. Each tower had four great feet, each resting on 20 cubic feet of solid concrete foundation. The wheel itself was 250 feet in diameter, 825 feet in circumference, 30 feet wide and elevated 15 feet from the ground. It was turned by steam-power and was provided with powerful brakes. The ground was broken for its erection March 20, 1893, and the completed wheel began to turn on June 20th. Up to the close of the Exposition 1,454,013 passengers were carried without accident of any kind, a complete revolution occupying about 20 minutes. The wheel cost $300,000, and at the conclusion of the Exposition was taken down and re-erected near Lincoln Park, in Chicago, where it still affords a magnificent panorama of Lake Michigan and Chicago's lofty buildings to tourists and visitors. Throughout the World's Fair it was lighted by 3,000 electric lights. A wheel for the same purpose, but different in size and construction, was completed April 27, 1895, at Earl's Court, London. Its diameter is 300 feet; its axle has a passage running through it of seven feet in diameter. The wheel hangs between two towers of four slanting columns, each 150 feet high, having saloons at the top. Forty carriages are hung on the periphery of the wheel, each being 24 feet long, 9 feet wide, and 10 feet high, and calculated to hold 30 passengers—in all 1,200. Passengers enter the cars from eight stages placed at the bottom of the wheel; the journey round takes about twenty minutes, including stoppages. The wheel is driven by two endless chains of short-link type, each being one thousand feet in length, and weighing eight tons. The motive power is taken from two fifty-horse power Robey under-type engines placed in an engine-house on the ground.

THE FERRIS WHEEL.

FERRO. See CANARY ISLANDS, Vol. IV, p. 800.

FERRY, JULES FRANÇOIS CAMILLE, a French statesman; born at Saint-Dié, Vosges, April 5, 1832; was admitted to the Paris bar in 1854, and identified himself with the opponents of the empire. He was condemned as one of the "thirteen" in 1864. In 1869 he was elected to the Corps Legislatif. He voted against the war with Prussia, but, during the siege, he was a prominent member of the Government of National Defense, assisting in suppressing the communistic rising in October, 1870. After the war he was minister at Athens (1872), and in 1879 he became Minister of Public Instruction. He introduced a bill directed against the Jesuits, which was passed by the Deputies, but twice thrown out in the Senate. The expulsion of the Jesuits was effected by decree founded upon disused laws, and the Ministry was dissolved in 1880. He then formed a Cabinet and embarked on a policy of "colonial expansion." His Cabinet resigned in 1881 on the question of the expedition to Tunis. He became Prime Minister again in 1883, and again entered on the career of aggrandizement in Madagascar and Tonquin, but his Ministry was overthrown in 1884 by an adverse vote relative to the war with China. He was now one of the most unpopular men in France, and the adverse vote was regarded as accomplishing his political death. He continued in retirement for nine years, until, in the beginning of 1893, he was recalled to public life during the Panama canal excitement. He was elected president of the Senate, but died suddenly in Paris, March 17, 1893.

FERRY, ORRIS SANFORD, an American soldier and public man; born at Bethel, Connecticut, Aug. 15, 1823; graduated at Yale in 1844; admitted to the bar in 1846; appointed lieutenant-colonel of the first division of Connecticut militia; judge of probate for the district of Norwalk, Connecticut, in 1849–56; elected to the state senate in 1855; elected to Congress in 1858; in 1861 colonel of the Fifth Connecticut Regiment, and promoted brigadier-general in 1862. Resigning his commission in 1865, was elected to the United States Senate in 1866; voted for the impeachment of President Johnson, and was re-elected to the Senate in 1872. He died at Norwalk, Connecticut, Nov. 21, 1875.

FERRY, PAUL, a French Protestant who became noted for his eloquence and his endeavors to bring about a reconciliation between the Roman Catholics and the Protestants, which won for him the name of "the Pacificator." He was born at Metz, Feb. 24, 1591; was educated at the Huguenot Seminary at Montaubon; took orders in 1612, and became pastor at Metz, where he remained until his death. He corresponded much with John Dury, in Scotland, and with his noted contemporary, Bossuet. Some of Ferry's enemies charge him with having accepted a pension from Richelieu in consideration of his efforts at bringing about a reunion between the Roman Catholics and the Protestants, even asserting that his receipts are to be seen in the National Library at Paris. He died July 28, 1669.

FERRY, THOMAS WHITE, an American statesman; born at Mackinac, Michigan, June 1, 1827; served in the state legislature some years and in Congress from December, 1865, to March, 1871, and was elected to the United States Senate in 1871. On the death of Vice-President Wilson in 1875, Mr. Ferry became acting Vice-President, and served as such until March 4, 1877. He was re-elected to the Senate, and served until March, 1883. He died at Grand Haven, Michigan, Oct. 14, 1896.

FERRYLAND, a port of southeastern Newfoundland, 45 miles S. of St. John's, the capital of Ferryland district. Lord Baltimore settled here in 1523, before he went to Maryland, but was forced to leave on account of the French disturbances. Population, 700.

FERTILIZATION, in botany, a sexual process in which two dissimilar gametes (sexual cells) fuse to form an *oöspore*. The two gametes usually differ from each other in size and activity, the male gamete (*spermatozoid* or *antherozoid*) being small and active, the female gamete (*oösphere*) being relatively large and passive. In case like gametes fuse, the sexual process is termed *conjugation*, and the product a *zygospore*. See also REPRODUCTION, Vol. XX, p. 425.

FERTILIZATION, ANIMAL. See EMBRYOLOGY, in these Supplements.

FERTILIZERS. See AGRICULTURE, Vol. I, pp. 342–353.

FESA OR FASA, a town of southwestern Persia, in the province of Fars, 80 miles S.E. of Shiraz, situated in a mountain defile, and is of considerable size. It has manufactories of silken, woolen and cotton fabrics, and some trade in a kind of tobacco. Population, 18,000.

FESCENNINE VERSES. See SATIRE, Vol. XXI, p. 318; DRAMA, Vol. VII, p. 409.

FESCUE, the popular name of *Festuca*, a large and widely diffused genus of grasses, very nearly allied to brome-grass, and including many of the most valuable pasture and fodder grasses. *F. ovina*, (sheep's fescue), and *F. elatior* (meadow-fescue) are common in cultivation as lawn and pasture grasses.

FESSENDEN, WILLIAM PITT, an American statesman; born in Boscawen, New Hampshire, Oct. 16, 1806; died in Portland, Maine, Sept. 8, 1869. He practiced law in Maine and was elected to the state legislature in 1832, in 1840, and again in 1845–46. In 1840 he was elected to Congress as a Whig, and served one term. In 1853–54 he was again in the state legislature, and in February, 1854, took the seat in the United States Senate, which he retained until 1864. He was a prominent opponent of the Kansas-Nebraska Bill, and took a leading part in the formation of the Republican party, and opposed slavery. On the resignation of Salmon P. Chase in July, 1864, Mr. Fessenden became Secretary of the Treasury, an office which he held until March 7, 1865. He was a third time elected to the Senate, and became chairman of the joint committee on reconstruction and of the finance committee. He opposed the impeachment of Andrew Johnson, and was one of the seven Republican Senators who voted "not guilty" in Johnson's case.

FESSLER, JOSEPH, an Austrian prelate; born at Lochau, Tyrol, Dec. 2, 1813; died April 25, 1872. He studied theology at Brixen; was ordained in 1837; in 1841 became professor of church history

and canon law at Brixen; and in 1852 professor of church history in the University of Vienna. He was made bishop of St. Pölten in 1865, and was general secretary of the Vatican Council in 1869. He published *Institutiones Patrologicæ* (1850–52) and *Sammlung Vermischter Schriften* (1869).

FEUILLANTS, CONGREGATION OF, a reform of the Cistercian order, remarkable as forming part of the great religious movement in the Roman Catholic Church during the sixteenth century, probably stimulated by the progress of the Reformation at that time. The author of this reform was Jean de la Barrière, abbot of the Cistercian monastery at Feuillants, in Languedoc, who laid down for himself a new and much more austere course of life, in which he soon found many associates among the brethren of his order. The rule was approved by Pope Sixtus V. The name was adopted by a French revolutionary club which held its meetings in the convent of the order in the Rue St. Honoré in Paris. See FRANCE, Vol. IX, p. 602.

FEUILLET, OCTAVE, a French novelist and dramatist; born at St.-Lô, in La Manche, Aug. 11, 1821; died Dec. 29, 1890; educated at the Collegé of Louis le Grand, Paris. He was for some time a literary assistant of Dumas, and began his own career with *Le Fruit Défendu*, in the *Révue Nouvelle*. In 1848 he published, in the *Révue des Deux Mondes*, a series of proverbs, comedies, tales and romances, which were collected in *Scènes et Proverbes* and *Scènes et Comédies* (5 vols., 1853–56). In 1862 he was elected to the French Academy, and was afterward librarian to the emperor. His most noted novel, *Le Roman d'un Jeune Homme Pauvre* (1858), gained great popularity throughout Europe, and *Histoire de Sibylle* (1862) was also very successful. These were followed by *M. de Camors* (1867); *Julia de Trécœur* (1872); *Un Mariage dans le Monde* (1875); *Les Amours de Philippe* (1877); *Le Journal d'une Femme* (1878); *Histoire d'une Parisienne* (1881); and *La Morte* (1886). Among his dramas are *La Nuit Terrible* (his first piece); *Le Bourgeois de Rome* (1846); *La Crise* (1848); *Le Village* (1855); *Dalila* (1857); *Montjoyè* (1863); *Le Cas de Conscience* (1867); *Julie* (1869); *L'Acrobate* (1873); *Le Sphinx* (1874); *Un Roman Parisien* (1883).

FEVER-BUSH, the *Lindera Benzoin*, or *Benzoin odoriferum*, a shrub of the laurel family, common in the eastern United States. It has an agreeable aromatic odor, and decoctions of its bark and leaves are used as a remedy for low fevers and other complaints. It is also called "spice-bush," "wild allspice" and "Benjamin-bush."

FEVERFEW, the common name of *Chrysanthemum Parthenium*, one of the *Compositæ*. It is a branching perennial, one to three feet high, with numerous pinnately divided leaves, and loose clusters of small heads with white rays. It has a strong and somewhat aromatic smell. The double varieties are common in gardens. It has been much cultivated for medicinal purposes, and is used in the cure of fevers.

FEVERWORT, the common name of species of *Triosteum*, a genus of the "honeysuckle" family, having an erect, hairy stem one to four feet high, opposite ovate or lanceolate entire leaves and axillary flowers. It is found in North America, where it is dried and the roasted berries occasionally used as a substitute for coffee. It is chiefly valued for its medicinal properties.

FEYEN, JACQUES EUGÈNE, a French painter; born at Bey-sur-le-Seille, Nov. 13, 1815; entered the School of Fine Arts in 1847, and was a pupil of Delaroche; commenced to exhibit at the Salon in 1841, and in 1866 began to attract special attention by his marine views, as well as by his Brittany subjects. Among his productions are *La Recette* (1867); *Le Jeu de Quilles à Cancale* (1877); *Berceus Berceuse Endormie* (1880); *Repas Frugal* (1883); *Lavandières Bretonnes* (1888); and *La Fiancée du Marin* (1890). He made an exhibition of his works, comprehending 265 canvases, in 1869, and received the decoration of the Legion of Honor in 1881.

FIBROUS TISSUE. See ANATOMY, Vol. I, p. 849; and HISTOLOGY, Vol. XII, p. 18.

FIBULA. See ANATOMY, Vol. I, p. 829.

FICHTE, IMMANUEL HERMANN VON, a German philosopher, son of Johann Gottlieb Fichte (q.v., Vol. IX, pp. 134–138); born at Jena, July 18, 1797; educated at the University of Berlin. After holding minor positions, he was appointed professor extraordinary of philosophy at Bonn in 1836, and in 1842 accepted the chair of philosophy at Tübingen, which he held for 25 years. His earliest important work was *Beiträge zur Characteristik der Neuern Philosophie* (1849). This was followed by *Ueber Gegensatz Wendepunkt und Ziel heutiger Philosophie* (1832–36); *Speculative Theologie* (1847); *System der Ethik* (1850–53); *Anthropologie* (1854); *Psychologie* (1864); *Philosophie, Theologie und Ethik* (1869); *Die Theistische Weltanschauung und Ihre Berechtigung* (1873). He edited his father's complete works, and published a *Life and Literary Letters* of the same in 1831. He died at Stuttgart, Aug. 8, 1879.

FICK, ADOLF EUGEN, a German physiologist; born at Cassel, Sept. 3, 1829; was educated at the universities of Marburg and Berlin; tutor from 1852 to 1856, and professor of physiology from 1856 to 1862, in the University of Zürich; extraordinary professor of physiology at Würzburg from 1862 to 1868; full professor in 1868. Among his works are *Lehrbuch der Medizinischen Physik* (1857); *Anatomie und Physiologie der Sinneswerkzeuge* (1864); *Kompendium der Physiologie* (1860); *Mechanische Arbeit und Warmeentwickelung bei der Muskelthätigkeit* (1882).

FICK, AUGUST, a German philologist; born at Petershagen, near Minden, May 5, 1833; studied at Göttingen, where he became professor of comparative philology in 1876; appointed to the same chair in Breslau in 1888. His studies were chiefly in the field of Indo-European origins. His principal work, *Vergleichendes Wörterbuch der Indogermanischen Sprachen*, originally published with a slightly different title in 1868, ran into a fourth edition in 1891. He also published scholarly editions of Homer's *Odyssey* and *Iliad*, and of the poems of Hesiod.

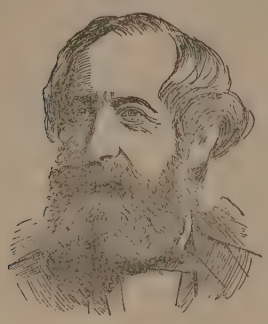
FIDDMIN, a village of the Fayum, Lower Egypt, inhabited by Mussulmans and Copts. It is remarkable for a large olive tree, popularly supposed to be the first one planted in Egypt, which yields annually nearly 300 pounds of olives.

FIDEI COMMISSUM. See ENTAIL, Vol. VIII, p. 454.

FIDUCIARY, a legal term meaning in trust or confidential. The law will not permit one standing in a fiduciary relation to another to make any profit at the expense of the person whose interests he is bound to protect, except upon full disclosure of the transaction. Controversy frequently arises as to what will constitute such a relation. Trustees, executors, administrators, and those with other similar duties, occupy fiduciary relations with those who are beneficiaries to the trust. See TRUSTEE, in these Supplements.

FIEF. See FEUDALISM, Vol. IX, p. 119.

FIELD, CYRUS WEST, constructor of the first Atlantic cable; born in Stockbridge, Massachusetts, Nov. 30, 1819. He received a good education, and in 1834 went to New York City as clerk in a dry-goods store. In 1840 he entered the paper business. Retiring in 1853, he traveled for a while in South America, and on his return in 1854 he began to give his attention to ocean telegraphs. After some discouragement, he was successful in procuring a charter to establish a telegraph from New York City to Newfoundland and thence to Europe. He crossed the Atlantic fifty times, and devoted 13 years to the execution of this undertaking. He personally engaged in constructing the land line of the telegraph in Newfoundland, and accompanied the expeditions of 1857 and 1858 fitted out to lay the cable in the deep water of the Atlantic Ocean between Europe and Newfoundland. Undismayed by the breakdown of the 1858 cable, he accompanied the *Great Eastern* expeditions of 1865 and 1866, the last of which resulted in complete success. For this achievement Mr. Field received a gold medal from Congress, and was covered with foreign decorations. He was an energetic promoter of elevated railroads in New York City. He erected, at Tarrytown, New York, a monument to the memory of Major John André, which was subsequently demolished by local fanatics. The last year of his life was embittered by financial embarrassment and family troubles. He died in New York City, July 12, 1892.

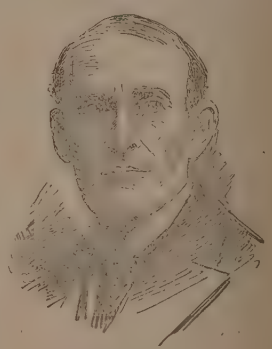


CYRUS W. FIELD.

FIELD, DAVID DUDLEY, an American clergyman; born at Madison (then East Guilford), Connecticut, May 20, 1781; graduated at Yale in 1802; and was licensed to preach in 1803. He was ordained in 1804, and till 1818 was minister in the Congregational Church in Haddam, Connecticut. From 1819 to 1837 he was pastor of the church at Stockbridge, Massachusetts, and from the latter year until 1844 was again in Haddam. From 1844 to 1851 he had charge of the church in Higganum, when he retired and returned to Stockbridge, where he passed his remaining days. He wrote a *Life of David Brainerd*, and histories of Middlesex and Berkshire counties, respectively in Connecticut and Massachusetts. He died at Stockbridge, April 15, 1867.

FIELD, DAVID DUDLEY, an American lawyer, son of the preceding; born at Haddam, Connecticut, Feb. 13, 1805. He studied at Williams College, was admitted to the New York bar in 1828, and continued in active practice until 1885. In 1847 he was appointed commissioner on practice and pleadings, and as such took part in the preparation of the code of procedure. The commission submitted the completed *Codes of Civil and Criminal Procedure* to the legislature in 1850, and they were enacted into law. In 1857 he was appointed by New York state head of a commission to prepare a political code, a penal code and a civil code, and they were completed in 1865. In 1873 Mr. Field presented to the Social Science Congress his *Outlines of an International Code*, which has been translated into French, Italian and Chinese. As a result, an association was formed for the reform and codification of the laws of nations, and Mr. Field was chosen its first president. This association, also, had for its object the substitution of arbitration for war in the settlement of disputes between nations. Besides numerous contributions to current literature on political topics, Mr. Field published *The Electoral Votes of 1876* (1877); and *Speeches, Arguments and Miscellaneous Papers* (1884). He died in New York City, April 13, 1894.

FIELD, EUGENE, an American journalist and poet, styled the "Poet Laureate of the Children," was born at St. Louis, Missouri, Sept. 2, 1850. His father was Roswell Martin Field, who was the first attorney for Dred Scott. In 1868 Eugene entered Williams College, and on the death of his father in 1869, he was sent to Knox College, Galesburg, Illinois. In 1871 he entered the State University of Missouri, which he left at the commencement of his senior year on the attainment of his majority. He traveled abroad, and returning indulged his natural bent, which was for newspaper-writing. His first position was with the St Louis *Journal* in 1873, of which he soon became city editor. He subsequently filled editorial positions on the St. Joseph (Missouri) *Gazette*, the St. Louis *Times-Journal*, the Kansas City *Times*, and the Denver (Colorado) *Tribune*. During this period his associates produced *The Denver Tribune Primer* and *The Model Primer*, which are much sought after on account of their quaint conceits. In 1882 he accepted a position on the Chicago *Morning News*, now *The Record*, where he conducted a column called *Sharps and Flats*, and in which he had absolute freedom of expression, and in which much of his best journalistic work appeared. As a poet he was most felicitous when treating of subjects interesting to childhood. His *Little Boy Blue*; *Wynken, Blynken and Nod*; *Jes' 'Fore*



EUGENE FIELD.

Christmas; and *Seein' Things*, are child classics. He was a confirmed bibliomaniac, and his *Love Affairs of a Bibliomaniac* was one of his most serious pieces of work. He was noted as a platform reader of his own productions, and it was for one of these reading trips that he was preparing when he died. In 1873 he was married to Julia M. Comstock of St. Joseph, Missouri. His married life was happy, and his seven children were the idols of the father's heart. Field was an incorrigible practical joker. The boldness, and often effrontery, of his well-laid plans to surprise his intimates and acquaintances would appal the ordinary perpetrator, while only making him the more seriously sedate in his enjoyment. He died at his home at Buena Park, a Chicago suburb, Nov. 4, 1895. His works include *Culture's Garland; or, Memoranda of the Gradual Rise of Literature, etc., in Chicago* (1887); *A Little Book of Western Verse; A Little Book of Profitable Tales* (1889); *With Trumpet and Drum* (1892); *Second Book of Verse* (1893); *The Holy Cross, and Other Tales* (1893); *Love Songs of Childhood* (1894); *Echoes from the Sabine Farm*, in collaboration with his brother, Roswell Martin Field (1895); *Love Affairs of a Bibliomaniac*, with an introduction by Roswell M. Field; *The House; Songs and Other Verse; Second Book of Tales* (1896).

FIELD, Henry Martyn, an American clergyman, son of the Rev. David Dudley Field; born at Stockbridge, Massachusetts, April 3, 1822. He was graduated at Williams College, studied theology, and from 1842 to 1847 was pastor of a Presbyterian church in St. Louis, Missouri. During 1847–48 he traveled in Europe, and on his return to the United States published an account of his experiences and observations abroad. In 1851 he became pastor of a Congregational church in West Springfield, Massachusetts. In 1855 he became one of the editors of *The Evangelist* of New York City, subsequently becoming its proprietor. He is the author of *The Irish Confederates* (1850); *Summer Pictures from Copenhagen to Venice* (1859); *History of the Atlantic Telegraph* (1866); *From the Lakes of Killarney to the Golden Horn* (1876); *From Egypt to Japan* (1878); *On the Desert* (1883); *Among the Holy Hills* (1884); *The Greek Islands and Turkey After the War* (1885); *Blood Thicker than Water* (1886); *Old Spain and New Spain* (1888); *Gibraltar* (1888); *Bright Skies and Dark Shadows* (1890).

FIELD, Kate (Mary Katherine Kemble), authoress and lecturer, a protégée of Walter Savage Landor; born in St. Louis, Mo., in 1840. After completing her studies in Boston, she made long visits to Europe and became correspondent for the New York *Tribune*, the Chicago *Tribune*, and the Philadelphia *Press*. Her father, Joseph M. Field, was an actor, and she herself appeared in *Peg Woffington* at Booth's Theater, New York (1874), and for a time followed the stage with some success. She engaged with marked success in lecturing upon the topics of the day. In 1890 she conceived the idea of a "personal" journal, and *Kate Field's Washington* was the result. It was extensively quoted for its graphic and often keen descriptions of public men in Washington. She was compelled to cease the publication of this journal in 1895 on account of ill health. She sought recuperation in travel, and died in Honolulu, May 19, 1896. She wrote *Adelaide Ristori* (1868); *Pen Photographs of Charles Dickens's Readings* (1868); *Planchette's Diary* (1868); *Hap-Hazard: Travel and Character Sketches in America and Europe* (1873); *Ten Days in Spain* (1874); *History of Bell's Telephone* (1878); and *Charles Albert Fechter* (1882).

FIELD, Stephen Johnson, jurist, son of David Dudley Field, Sr.; born in Haddam, Conn., Nov. 4, 1816. In 1837 he began the study of law with his brother, David Dudley, and after his admission to the bar, became a partner in the firm. In 1849 he went to San Francisco and became a member of the first legislature held after the admission of California into the Union. In 1857 he was elected judge of the supreme court of California, and in 1863 was appointed to the supreme bench of the United States. In 1869 he was appointed professor of law in the University of California. He was a member of the Hayes-Tilden Electoral Commission of 1877, and voted with the Democratic minority. In 1880 he was a candidate for the Presidential nomination, and received 65 votes in the convention. In 1889 he was assaulted by Judge Terry of California, who was killed by U. S. deputy marshal, David Neagle, who had been deputed to protect Justice Field. He retired from the supreme court, Dec. 1, 1897. Died in Washington, D. C., April 9, 1899.

FIELD, Electric. See Electricity, §§ 8, 9, 16, in these Supplements.

FIELD-GLASS, Souchard's, a powerful binocular glass for determining the exact distance of an object from the observer, which has recently come into use in the French army. When the glass is in focus, there are interposed, by means of the fingers, between the eye and the object, two prisms of Iceland spar. Then there are immediately brought into the field of vision two images, one of the real object, and the other a smoky fac-simile, directly in a line with and at the rear of it. The second image is more elevated, since the distance is greater. The object that serves for the adjustment of the glass as used in the French army is either a soldier of ordinary stature or one on horseback. If the head of the real image reaches to the shoulder of the fac-simile, he is distant just three hundred meters; if to the waist of the image, six hundred meters; and if to the knees, one thousand meters. If the feet of the image apparently rest upon the head of the soldier, the distance is exactly fourteen hundred meters. If there is a space between the feet of the one and the head of the other, the distance can be only approximately determined.

FIELD-MAGNETS. See Magnetism, Vol. XV, pp. 222, 223; and Electricity, § 82, in these Supplements.

FIELD-MATRONS. See Indian Affairs, in these Supplements.

FIELD-MOUSE or MEADOW-MOUSE, a name popularly given to various mice which dwell in fields, especially to members of the *Arvicolinæ*. Many are very destructive to trees and grain crops. In Europe, where they have been at times very destructive, it has been found possible to destroy

them by artificially inoculating a specimen with a germ-disease, which soon becomes epidemic when the inoculated animals are set free in the fields.

FIELDS, James Thomas, an American poet and publisher; born at Portsmouth, New Hampshire, Dec. 31, 1817. From 1838 to 1870 he was a member of the firm of Ticknor, Reed and Fields of Boston, and from 1862 to 1870 edited the *Atlantic Monthly*. His contributions to letters were of a high order, and he exerted an important influence on American literature. His works include *Yesterdays With Authors* (1871); *Hawthorne* (1876); and *In and Out of Doors with Charles Dickens* (1876). He died in Boston, Massachusetts, April 24, 1881.

FIELD–TRAIN, a department of artillery, consisting of commissaries and conductors of stores, whose duty it is to attend to the formation of proper depots of shot, etc., between the front and base of operations, and to keep a due proportion constantly at the service of each gun during an engagement; they are also responsible for the safe custody of the ammunition.

FIELD–WORKS. See Fortification, Vol. IX, p. 421.

FIFE. See Flute, Vol. IX, p. 351.

FIFE, Alexander William George Duff, Duke of, an English nobleman; born Nov. 10, 1849; succeeded his father as sixth Earl of Fife in 1879, and was created Duke of Fife in 1889, on his marriage with Princess Louise Victoria Alexandra Dagmar, the eldest daughter of the Prince of Wales. The Duke was educated at Eton; is Lord Lieutenant of Elginshire; a member of the council of the Duchy of Lancaster, and a partner in the metropolitan banking firm of Sir Samuel Scott and Company. He sat as M.P. for Elgin and Nairn, in the Liberal interest, in 1874–79; went on a special mission to the King of Saxony in 1882; and in recognition of his diplomatic services received the first Order of Saxony; was captain and gold stick of the corps of Gentlemen-at-Arms from 1880 to 1885. The Duke and Duchess of Fife have two daughters: Lady Alexandra Victoria Alberta Edwina Louise, born at East Sheen Lodge, May 19, 1891, and Lady Maud Alexandra Victoria Georgia Bertha, born at the same place, April 3, 1893.

FIFER, Joseph W., an American public man born at Staunton, Virginia; removed to McLean County, Illinois, when a boy, and worked on a farm and as a bricklayer. In 1861 he enlisted in the Thirty-third Illinois Volunteers, serving in the ranks until July, 1863, when he was badly wounded at Jackson, Mississippi, but recovered, and rejoined his regiment. After the war he studied at Illinois Wesleyan University; became a lawyer in 1869; corporation counsel of Bloomington in 1871; state's attorney of McLean County from 1877 to 1880, and state senator from 1880 to 1884. He was elected governor of Illinois, as a Republican, in November, 1888, over General John M. Palmer, and was defeated for re-election in 1892 by John P. Altgeld.

FIFTH, in music, an interval comprising five degrees of the scale. A perfect fifth is the equal of three diatonic steps and a half; a fifth a half-step shorter is termed *diminished* or *minor;* and one a half-step longer is termed *augmented* or *superfluous.*

FIFTEENTH, in music, a double-octave, or fifteen grades of the scale from the lower note to the upper; also, an organ-stop of two-foot pitch.

FIG, a tree. See Fig, Vol. IX, pp. 153–155; and Caprification, in these Supplements.

FIGHTING–FISH, a small fresh-water fish of the family *Anabantidæ*. It is a native of Asia, and particularly of Siam, where it is kept in glass globes on account of its pugnacity. When two of these creatures are brought together they rush immediately to combat. Fish-fights are a favorite amusement of the Siamese.

FIGUEIRA DA FOZ, a watering-place in the Portuguese province of Beira, at the mouth of the Mondego, 23 miles W. by S. of Coimbra, and the terminus of a railroad from Salamanca. Its harbor is excellent, but difficult of access. Population, 5,000.

FIGUERAS, Estanislao, a Spanish statesman; born at Barcelona, Spain, Nov. 13, 1819; was elected to the Cortes as a Republican in 1850, and was imprisoned for conspiracy against Isabella. In 1870 he was a member of the provisional government, and in 1873, after the abdication of Amadeus, was provisional president of the Spanish Republic, retiring in the course of four months. He died in Madrid, Nov. 11, 1882.

FIGUIER, Guillaume Louis, a French scientific writer; born at Montpellier, Feb. 15, 1819. He studied chemistry there, and in 1841 received the degree of M.D. He was appointed professor at the Montpellier School of Pharmacy in 1846, and in 1853 went to Paris to occupy a similar post there. He wrote *Exposition et Histoire des Principales Découvertes Scientifiques Modernes* (1851); *L'Alchimie et les Alchimistes* (1854); *Histoire du Merveilleux dans les Temps Modernes* (1859–60); *Les Nouvelles Conquêtes de la Science* (1883–85); *Les Mystères de la Science* (1887). A number of his popular presentations of science and natural history have been translated into English, including *The Vegetable World; The Ocean World; The Wonders of Science;* and *The Wonders of Industry.* Died in Paris, Nov. 9, 1894.

FIGURATE NUMBERS. See Tables, Vol. XXIII, p. 13.

FIGURED or FIGURATE, in music, opposed to *simple*, characterized by the use of passing notes. The term was formerly used in ecclesiastical music to distinguish chants which have been varied, and rendered more ornamental and expressive, from the original Gregorian chants, which were exceedingly plain. The term was afterward applied to elaborate pieces, in distinction from those of "strict" style.

FIGURED BASS, in music, a bass part with figures placed over the notes, which indicate the harmony to be played to each note, and serve as a guide to the accompanist.

FIGWORT, the common name of *Scrophularia*.

a genus of plants of the large family *Scrophulariaceæ*. They are mostly herbaceous and natives of temperate regions. The roots of some are purgative and emetic. *S. nodosa* is a common species of the United States, and especially notable for its protogynous flowers.

FILAMENT. See BOTANY, Vol. IV, p. 136.

FILARIA. See NEMATOIDEA, Vol. XVII, p. 325; and VETERINARY SCIENCE, Vol. XXIV, p. 206.

FILBERT. See HAZEL, Vol. XI, p. 548.

FILDES, LUKE, a British artist; born in Liverpool, Oct. 14, 1844; studied in the schools of South Kensington, and later at the Royal Academy. He began his career by furnishing drawings on the wood to several papers and magazines, including *Cornhill Magazine*, *Once a Week* and the *Graphic*. He also illustrated books, more particularly those of Dickens and Lever. He first exhibited at the Royal Academy in 1868, when he sent *Nightfall*, followed in a few years by *The Empty Chair*, which achieved no small popularity. A still greater success was made with *Applicants for Admission to a Casual Ward*. Mr. Fildes forsook these mournful subjects for a series of gay scenes of Venetian life, single figures and brilliant portraits, but in 1891 produced *The Doctor*, one of the most popular pictures that had been exhibited at the Royal Academy. He was elected a Royal Academician in 1887. His wife also exhibited at the Academy, to which she sent, in 1878, *Peeling Potatoes* and *A Berkshire Cottage*.

FILICINÆ. See FERNS, Vol. IX, p. 101.

FILIOQUE. See CREEDS, Vol. VI, p. 561.

FILLMORE, JOHN COMFORT, an American musician and author; born at Franklin, Connecticut, Feb. 4, 1843; educated at Oberlin College and at the Leipsic Conservatory of Music. He became director of the Conservatory of Music at Oberlin College in 1867; was professor of music at Ripon College from 1867 to 1877; and at the School of Music for Young Ladies at Milwaukee in 1878–84. In 1884 he organized the School of Music in the latter city. He wrote a *History of Pianoforte Music*, with biographical sketches of its greatest masters (1883), and an English edition of the same, with a preface by Ridley Prentice, was most favorably noticed by critics, and appeared at London in 1885; *New Lessons on Harmony*, based on the work of Dr. Hugo Riemann (1887); and *Lessons in Musical History* (1888).

FILLMORE CITY, a growing city and the capital of Millard County, central western Utah, a few miles west of Mt. Catharine. It has a few public buildings and tanneries and flour-mills. Population, mostly Mormons, 1890, 514; 1895, 1,077.

FILM PHOTOGRAPHY. See PHOTOGRAPHY, in these Supplements.

*FINANCES OF THE UNITED STATES. The circulation in the United States since 1861 has consisted of government and bank issues of paper, and of gold and silver coin.

When Congress convened in special session at the call of the President on July 4, 1861, the Treasury was practically empty. It was known that there was in circulation in the country $250,000,000 silver and gold and $180,000,000 of state bank notes,—in all, $430,000,000.

On July 17th, 13 days later, an act was passed providing for the issue of certain bonds and $50,000,000 Treasury notes, payable on demand, and commonly known as "demand notes." The issue of these notes was the first attempt to create a national currency. The fatal defect in the notes was the promise to pay on demand, when there was nothing to pay them with. These notes were paid out by the Treasury, but were presented for redemption in coin, or in payment of customs duties to the exclusion of coin, and thus both the banks and the government were greatly embarrassed by lack of a circulating medium, the banks suspending specie payments on Dec. 31, 1861, and the government a few days later. With the war expenditure of nearly two million dollars a day, it was apparent that a radical change in existing laws relating to our currency must be made, which should provide some form of paper money that would be available for circulation; and this was the subject of long debates in Congress.

As a solution of the problem, the act of Feb. 25, 1862, was passed, providing for the issue of United States notes to the amount of $150,000,000, not bearing interest, payable to bearer at the Treasury of the United States at Washington or New York, of which $50,000,000 were to replace the Treasury notes of the previous July. It also provided that the notes should be receivable in payment of all demands of every kind due to the United States, except duties on imports, and all claims and demands against the United States of every kind whatsoever, except interest upon bonds and notes, which was to be paid in coin, and, with these exceptions, that they should be lawful money and legal tender in payment of all debts, public and private, within the United States. It also provided that they might be converted into the six-per-cent bonds authorized by the same act, and that they might be reissued from time to time, as the exigencies of the public service should require. It was silent as to the time of payment of the notes, but each note contained a promise of the United States to pay a specific sum, and the implied obligation was to pay in coin as soon as practicable.

The measure was bitterly opposed in both Houses, all the Democrats and a few of the Republicans voting against it. Even the friends of the measure justified their action only as a war necessity, and none contemplated the retention of the notes in circulation when the exigencies which had called them into existence should have ceased. Subsequently, the amount of these notes was increased to $450,000,000, and the authority for their conversion into six-per-cent bonds repealed.

To create a market for the bonds of the government, a measure was introduced in Congress, which became a law Feb. 25, 1863, creating a system of banks under charter from the government, to issue notes to the extent of ninety per cent of the United States bonds deposited

*Copyright, 1897, by The Werner Company.

in the Treasury as collateral security for their payment. These notes were made redeemable in lawful money, but were not made a legal tender for debts. On the passage of this bill, one Democratic senator, Nesmith of Oregon, voted for it, and seven Republican Senators against it. In the House, two Democrats voted for it, and 25 Republicans against it. It was regarded as a peculiarly administration measure, being especially urged by the Secretary of the Treasury. Later, a tax of ten per cent per annum was imposed upon the issues of state banks, thus virtually driving them from circulation, leaving the field to the United States and national bank notes.

These acts were doubtless the most important and far-reaching of the financial measures of the war.

The great amount of the government issues, and the doubt of the ability of the government ever to redeem its notes in coin, caused them to become greatly depreciated in value, and when the Civil War ended there was a general feeling throughout the country that some steps looking to their appreciation should be taken. The House of Representatives, therefore, on Dec. 18, 1865, by a vote of 144 to 6, pledged co-operation with the Secretary of the Treasury to bring about as early a resumption of specie payments as the business interests of the country would permit; and on April 12, 1866, an act was approved directing the cancellation of United States notes to the extent of not more than $4,000,000 per month; but on Feb. 4, 1868, the act was repealed, leaving of such notes outstanding $356,000,000.

When, after the close of the war, nearly $300,000,000 of debt had been paid out of current revenue, it was proposed in Congress to refund the remaining bonds as rapidly as possible into others bearing a lower rate of interest. Here the question arose, whether the bonds known as 5–20's could be paid in lawful money after the period of five years, when, by their terms, they were redeemable. These bonds promised to pay so many dollars. Other bonds were specifically payable in coin, and still others were payable in lawful money—that is, in United States notes. These notes were then at a discount, being worth, in the market, about 86 cents in coin. But it was contended that they were an obligation of the United States, and it was the duty, and then within the power, of the United States to advance them to par in coin. This controversy as to the payment of the bonds in coin was decided by the act approved March 19, 1869, "to strengthen the public credit," which committed the government to the payment of United States notes and bonds in coin or its equivalent.

Different schemes with a view to appreciating the notes to par with coin were discussed in Congress, and many bills to that end introduced. To every such proposition, however, there arose no little opposition, and a party of considerable strength was organized which demanded further issues of the notes, regardless of their depreciated value.

At the first conference of Republican Senators held after Congress met in December, 1874, a committee, composed of John Sherman, William B. Allison, George S. Boutwell, Roscoe Conkling, George F. Edmunds, Thomas W. Ferry, F. T. Frelinghuysen, Timothy O. Howe, John A. Logan, Oliver P. Morton and Aaron A. Sargent, was appointed to formulate a bill for the purpose of advancing United States notes to par in coin, and thus return to specie payments. At first the divergence of opinion in the committee was so great that an agreement seemed almost impossible. Yet the necessity of an agreement was so absolute that a failure to agree was a disruption of the Republican party. The result was the passage of the act of Jan. 14, 1875, providing for the redemption, in coin, on and after Jan. 1, 1879, of the United States notes then outstanding. The bill was a party measure, and was passed in both houses by a party vote, no Democrat voting for it.

The act also provided for the redemption, in subsidiary silver, of the fractional notes which had been issued during the war, and of which about $40,000,000 was outstanding; for an unrestricted issue of national bank notes, and a retirement of United States notes to the amount of 80 per cent of the increase of such bank issues, and the redemption, in coin, of the United States notes at the subtreasury in New York on and after Jan. 1, 1879. To carry out the provisions of the act, the Secretary of the Treasury was authorized to use the surplus revenues of the Treasury and to sell any of the description of bonds authorized by the refunding act of July 14, 1870.

In 1876 the fractional notes were redeemed in silver coins, as provided by the act, the silver for the necessary coins being purchased by the government.

On Feb. 28, 1878, both Houses passed, over the veto of President Hayes, what was known as the Bland-Allison act, which directed the Secretary of the Treasury to purchase, at best rates obtainable, silver bullion to the amount of not more than four million, or less than two million, dollars' worth per month, and to have it coined into silver dollars of full legal-tender power, and to issue certificates, receivable for any government dues, upon the deposit of these coins in the Treasury. This act brought into circulation two new elements—silver dollars, the coinage of which had been prohibited since 1873, and the certificates. The reason for the veto of the President was his belief that to make, for all amounts, a legal tender of a dollar, the bullion in which was not of equal commercial value to the gold dollar, would greatly disturb the public credit. The requirements of the act were promptly carried into effect.

On Jan. 1, 1879, specie payments were resumed as contemplated, $140,000,000 of gold being held by the Treasury for that purpose, of which $95,000,000 had been accumulated by sale of bonds, as provided in the resumption act. There were outstanding, at the same time, of United States notes, about $346,000,000. On and

after the day fixed they were, when presented for the purpose, redeemed with gold coin; but instead of the notes being presented for redemption, gold coin in exchange for them was deposited, thus increasing the gold in the Treasury, instead of depleting it.

Subsequently, an agitation for an increased use of silver arose in the Southern and silver-producing states. To appease this demand, the House of Representatives, in the first session of the Fifty-first Congress, passed a bill providing for the purchase of $4,500,000 worth of silver a month, to be paid for in Treasury notes. The Senate substituted a provision for the free coinage of silver as before 1873. The two propositions went to a conference committee of the two Houses, and the result was the act of July 12, 1890. It provided for the purchase of 4,500,000 ounces of silver bullion each month, and the issue in payment therefor of Treasury notes. It also repealed so much of the act of Feb. 28, 1878, as required the monthly purchase and coinage of silver bullion. It required the monthly purchase of a greater amount of silver than before, but that could be held in the form of bullion, and could be paid for by Treasury notes equal in amount to the cost of the bullion, the whole of which was held in the Treasury as security for the payment of the notes, the bullion to be coined only as necessary to redeem the notes.

These notes were designed to circulate as money, were made a full legal tender in payment of all debts, public and private, and were redeemable in either gold or silver, at the option of the Secretary of the Treasury; the law, however, declaring it to be the policy of the government to maintain a parity of value between the two metals. The requirements of this act were duly met, the Treasury purchasing and burying in its vaults nearly the entire product of the silver-mines of the country, issuing notes therefor, and coining dollars only as needed. When the notes were presented for redemption, it was thought that to refuse payment in either coin would destroy the parity, and therefore they were redeemed in gold when demanded.

In 1893 the country was in the throes of a commercial panic, which naturally still further diminished the public revenues, already reduced by the tariff act of 1890, known as the McKinley Law.

On the 8th of Aug. 1893, Congress met in extraordinary session, in pursuance of a proclamation of President Cleveland. Both Houses were Democratic. In his message the President depicted an alarming condition of the national finances, and attributed it to Congressional legislation touching the purchase and coinage of silver by the general government. He ascribed the evil of the times to the monthly purchase of 4,500,000 ounces of silver bullion, and the payment therefor with Treasury notes redeemable in gold or silver coin, at the discretion of the Secretary of the Treasury, and to the reissue of the notes after redemption. He stated that up to the 15th of July, 1893, such notes had been issued, for the purpose mentioned, to the amount of more than $147,000,000. In a single year more than $40,000,000 of these notes had been redeemed in gold. This threatened the reserve of gold held for the redemption of United States notes, and the whole financial system of the government.

A debate in Congress followed, lasting nearly four months, resulting, by the aid of the Republicans, in the passage of the act of Nov. 1, 1893, repealing the clause of the act of July 12, 1890, directing the purchase of silver bullion and the issue of Treasury notes in payment therefor.

The annual message of the President of Dec. 4, 1893, was especially urgent in recommending a revision of the tariff law. This led to the passage of what is known as the Wilson Tariff Law on Aug. 13, 1894. It was understood that this bill, as originally introduced, met the President's wishes, but it had been so changed in the course of a long debate, and in bringing the two Houses of Congress into agreement, that he refused to sign it, and it became a law without his approval. The act as passed met with no great favor in either party. The income tax therein provided was declared unconstitutional by the supreme court of the United States, and the other revenues provided fell short of a sufficiency to meet the current expenses of the government.

The gold reserve in the Treasury had been depleted by the redemption in gold of both the legal tender notes and the Treasury notes of 1890 presented for that purpose, and, to restore it, sales of four and five per cent bonds for gold were made by Mr. Cleveland's administration, to the amount of $262,000,000, for which a considerable premium was received. The President alleged that the reserve was despoiled for the benefit of those who found profit in shipping gold abroad, or whose fears induced them to hoard it at home. The difficulty, he thought, was, that, with about five hundred million dollars of currency notes of the government for which gold may be demanded, and which the law required to be reissued when redeemed and paid in gold, the same notes did duty many times in drawing gold from the Treasury. This he called "the endless chain of depletion." One remedy he proposed was, that when notes were redeemed, they should be canceled, and not reissued. On the other hand, those in favor of retaining the notes in circulation claim that such a difficulty has never occurred before, and that with a sufficient revenue there would be no necessity of reissuing notes redeemed until they were replaced by the gold which had been withdrawn for their redemption, thus destroying the "endless chain."

At the commencement of the session in December, 1895, the House of Representatives, largely Republican, promptly passed two measures intended to relieve the Treasury; one authorizing the sale of three-per-cent bonds to meet temporary deficiencies in the revenue, and the other to increase the tariff levied by the Wilson law 15 per cent, which increase it was supposed would yield about forty million dollars a year additional revenue. The bond bill was amended in the

Senate, with a provision for the free coinage of silver, which amendment was disagreed to by the House, and as long as the differences of the two Houses remain irreconcilable, no further action can be expected on the bill. The tariff bill was also amended in the Senate committee on finance, by adding a free-coinage provision. It was so reported to the Senate and placed on the calendar, where it has thus far (1896) remained, as two attempts to call it up for consideration have been defeated by a combination of all the Democratic Senators with a few Republicans from states producing silver. Owing to conflicts of opinion between the administration and Congress, and between the Senate and House of Representatives, no financial legislation could be expected of the Fifty-fourth Congress. See also COINAGE LAWS, in these Supplements.

JOHN SHERMAN.

FINBACK-WHALE OR RORQUAL, the whales of the tribe *Balænopteridæ*, characterized by having a large, prominent dorsal fin. Certain species of finbacks are the largest existing mammals. A length of eighty feet is often reached. Most of the rorquals furnish a small amount of oil and a very poor quality of whalebone. See WHALE, Vol. XXIV, p. 524.

FINDING. See THEFT, Vol. XXIII, pp. 232, 233.

FINDLAY, the county seat of Hancock County, a flourishing town in the northwestern portion of Ohio. In 1885 it possessed few commercial advantages, but by the discovery of natural gas in that year it received an extraordinary impulse. By June 1, 1889, there were 43 wells in operation. The Great Karg well was the largest in the world until the discovery of the Tippecanoe in 1888. Numerous manufactories have been established; 11 glass-works employ seventeen hundred men, and two pressed-brick works have an output of forty million bricks per annum; there are also pottery-works, barrel, rake, stove, spoke, carriage and tool factories, foundries, machine-shops and mills. Findlay was one of the first places where aluminium was manufactured in commercial quantities. The city has several fine public buildings, among them a courthouse, a substantial stone structure costing over three hundred thousand dollars. There are 18 churches. Population 1890, 18,553.

FINERTY, JOHN F., an Irish-American journalist; born in Galway, Ireland, in 1846; was educated in private schools, and became identified, while still a boy, with the Irish revolutionary movement. In 1864 he left Ireland for America, and served for about a year in the Union army. He became attached to the press of Chicago in 1865, and in this capacity witnessed the Fenian raids in Canada in 1866 and 1870. Thereafter he served in various capacities on other Chicago newspapers, and as a press correspondent visited the Rio Grande, Texas, and old Mexico, and was with General Miles during the historical campaign against Sitting Bull in 1879. Mr. Finerty organized the Irish Land League convention which met in Chicago in 1881, and which raised $500,000 for the cause of Ireland. In 1882 he began the publication of the *Citizen* newspaper, and in November of that year was elected to Congress as an independent from the second district of Illinois. He published *Warpath and Bivouac; or, The Conquest of the Sioux Indians* (1890).

FINGAL'S CAVE. See CAVE, Vol. V, p. 265.

FINGER. See ANATOMY, Vol. I, p. 828.

FINIAL. See ARCHITECTURE, Vol. II, p. 464.

FINING OR CLARIFICATION, the process of refining or purifying, referring particularly to the clarification of wines, malt liquors, etc. When wine is in good condition, it does not usually require fining, as the matter in suspension agglomerates, and is carried to the bottom shortly after the fermentation is completed; but when the wines are turbid, and contain mucilaginous matter which is inclined to remain in suspension, some material is used for securing its precipitation. Isinglass or gelatine is used for this purpose. The "fining" is mixed into some of the liquor to be fined, the mixture poured into the cask and the liquor stirred. The gelatine is coagulated or rendered insoluble by the astringent tannic acid of the liquor, and sinks to the bottom, carrying with it the suspended matter. The removal of astringent matters is, however, not in all cases advantageous, as the flavor and keeping qualities of the liquor are impaired. Albumen is preferred for fining red wines on this account, as it does not so much affect the flavor. In the clarification of syrups, albumen is used. Heat being applied, the albumen coagulates and contracts from its diffusion, forming a scum, which can be removed with the suspended matter which it has enveloped. What may settle to the bottom can be separated by means of bag-filters. Clear soups are made by the albumen of the meat itself performing the same function. Alcohol, as it coagulates albumen, may be used for fining wines or cordials without the application of heat, and it is used for fining red wines. Isinglass "fining" is made by soaking one pound of the material in three or four pints of water, sour beer or cider, adding more of the liquor until the isinglass dissolves; it is then strained through a sieve and is mixed with seven or eight gallons of the liquor to be fined. About a pint to a pint and a half is the quantity required for a barrel of ale or porter, or for a hogshead of wine. Ox-blood is used in the same manner as albumen or isinglass, especially in fining sugar. The sulphate of lime in the water at Burton-on-Trent is believed to aid in clarifying the famous ale there made. Alum is serviceable in the clarification of turbid or muddy water for drinking. A pinch of this substance will clarify a barrel of water within an hour. A strip of isinglass, or a piece of sole-leather, etc., will clarify coffee.

FINK, ALBERT, an American civil engineer; born near Frankfort-on-the-Main, Germany, Oct. 27, 1827; graduated at the Darmstadt Institute in 1848, and emigrated to the United States in 1849. He entered the service of the Baltimore and Ohio railroad, and was chief assistant to Ben-

jamin Henry Latrobe, the architect. He invented the "Fink truss," and designed the first important iron bridges in the United States, along the Baltimore and Ohio line, between Cumberland and Wheeling. He was also consulting-engineer to the Norfolk and Petersburg railway, designing the bridge at Norfolk. He then became chief assistant to the chief engineer of the Louisville and Nashville railway, and in this capacity built the great bridge over the Ohio, at Louisville. During the Civil War, damage to the extent of $620,000 was done to the works constructed by him for the Louisville and Nashville railroad, which damage he was called upon to make good. He became general manager of the line in 1865 and vice-president in 1870, but resigned in 1875, and organized the Southern Railway and Steamship Association for the better management of the traffic. In 1877 he accepted a proposition to organize the traffic of the great western trunk lines. The "pool" was formed, and a complete revolution in the traffic management of railways in America resulted from his success in this undertaking. Died near Sing Sing, N. Y., April 3, 1897.

FINLAND. For the history and earlier statistics of the grand duchy of Finland, see Vol. IX, pp. 216–20. The constitution of Finland, dating from the year 1772, reformed in 1789, and slightly modified in 1869 and 1882, provided for a national parliament, consisting of four estates—the nobles, the clergy, the burghers, and the peasants—convoked by the "Grand Duke," the Emperor of Russia, for four months. They discuss the schemes of laws proposed by the Emperor, who has the right of veto. The unanimous assent of all four chambers is necessary for making changes in the constitution and for levying new taxes. The national representatives have been regularly convoked, since 1861, every four or five years. The schemes of laws are elaborated by the "Committee for the Affairs of Finland," which sits at St. Petersburg, and consists of the state secretary and four members, nominated by the crown (two of them being proposed by the senate). The senate, which sits at Helsingfors, under the presidency of the governor-general, is nominated by the crown. It is the superior administrative power in Finland, and consists of two departments, justice and finance, which have under them the administration of posts, railways, canals, custom-houses, hygiene, and the tribunals. The military department is under the Russian Ministry of War, and the foreign affairs under the Russian Chancellor. Finland had its own money and system of custom-houses, but by a law of Aug. 14, 1890, the circulation of Russian rubles and silver money was rendered obligatory. The penal code elaborated by the senate, which was to have been promulgated on Jan. 1, 1891, was suspended by the Russian government till further notice. On Feb. 15, 1899, the Russian government issued a manifesto which virtually annulled the Finnish constitution.

The present area of Finland is 144,255 square miles. The following table shows the area of the several provinces, with the population for 1897:

Province.	Area.	Population.	Density per Sq. Mile.
Åbo-Björneborg	9,333	419,369	47
Kuopio	16,499	300,291	22
Nyland	4,584	264,243	61
St. Michel	8,819	185,098	28
Tavastehus	8,334	276,010	40
Uleåborg	63,957	260,763	4
Viborg	13,530	379,115	33
Vasa	16,105	435,548	30
Lake Ladoga	3,094		
Total	144,255	2,520,437	

The gradual increase of the population is seen from the following table:

Years.	In Towns.	In Country.	Total.
1830	76,489	1,295,588	1,372,077
1870	131,603	1,637,166	1,768,769
1890	235,227	2,144,913	2,380,140
1896	272,415	2,248,022	2,520,437

Of the total population, 2,473,441 were Lutherans, the others being Greek Orthodox, Roman Catholics, Methodists, and Baptists. The population includes 341,500 Swedes, 7,000 Russians, 1,790 Germans, and 1,150 Lapps.

The chief towns are Helsingfors, population 69,025; Åbo, 33,077; Tammerfors, 23,237; Wiborg, 22,344; Uleaborg, 13,383; Björneborg, 10,813; and Nikolastad (Vasa), 11,327.

Education is well provided for. There is one university, which had, in 1897, 2,062 students, and a large number of other institutions for providing special and technical education.

The receipts of the government, estimated for 1897, were 65,601,746 marks, and expenditure the same. The public debt (Jan. 1, 1898), amounted to 84,264,668 marks. The chief crops are wheat, rye, barley, flax, oats, sarrazin, peas, potatoes, and hemp. Cattle constitute the principal live-stock, there being 1,409,183. There were 1,067,384 sheep, 197,356 swine, 300,650 horses, and 129,984 reindeer. The total imports amounted to 202,500,000 marks, and exports to 168,700,000 marks. The chief imports are cereals, coffee, sugar, hardware, cotton, woolens, machinery, chemicals, leatherware, tobacco, colors, and oils. The chief exports are timber, butter, paper, paper mass, cardboard, iron goods, cottons, leather, hides, tar, and pitch. The merchant marine numbered, in 1898, 2,008 vessels; aggregate capacity, 283,912 tons.

FINLAND, Gulf of, an arm of the Baltic, extending eastward along the 60th parallel of latitude for nearly three hundred miles into the coast of Russia. Its average width is 60 miles, and it is in few places over 60 fathoms in depth. St. Petersburg is situated at its eastern extremity. Its shores are rocky and its waters are only slightly salt.

FINLEY, John Park, an American meteorologist; born in Ann Arbor, Michigan, April 11, 1854; graduated at the Michigan State Agricultural College, and was appointed assistant in the Pacific Coast division of the Weather Service. He

published *The Tornadoes of May 29 and 30, 1879*, in the Signal Service Reports (1881); *Tornadoes: What They Are, and How to Observe Them* (1887); *Sailor's Handbook of Storm-track, Fog and Ice Charts of the North Atlantic and Gulf of Mexico* (1889); *On the Development of Tornadoes* (1890).

FINLEY, Samuel, an American educator; born in County Armagh, Ireland, in 1715; arrived in the United States in 1734. He studied for the ministry, was licensed to preach in 1740, and ordained two years later, at New Brunswick, New Jersey. He went to New Haven, Connecticut, and in 1743 began to conduct revival services, despite the prohibition against itinerant preaching in the parishes of settled ministers, and was seized and conveyed outside the limits of the colony. He established an academy at Nottingham, Maryland; and in 1761 became president of the College of New Jersey, at Princeton. He published some sermons and theological treatises, and edited the sermons of his predecessor, President Davis. He died at Philadelphia, July 17, 1766.

FINMARK, a province of Norway, lying between lat. 68° 30′ and 71° N., and long. 17° 31′ E., and constituting Norwegian Lapland. It has an area of about 20,000 square miles. The interior is intersected by a range of snow-covered mountains, reaching an elevation of 4,000 feet. Agriculture is impracticable above an elevation of one hundred feet. Fish and game constitute almost the sole food of the inhabitants. The principal sources of wealth are the reindeer in the north and the cod-fisheries in the south. Area, 18,296 square miles; population, 29,170.

FINNEY, Charles Grandison, an American Presbyterian clergyman; born at Warren, Connecticut, Aug. 29, 1792; licensed to preach in 1824. He became an evangelist, and labored with great success in Utica, Troy, Philadelphia, Boston and New York. From 1835 until his death he was professor of theology at Oberlin College, Ohio, and in 1851–66 was its president. He spent three years in England as a revivalist. He published *Lectures to Professing Christians* (1839); *Lectures on Revivals of Religion* (1840); *Sermons on Important Subjects* (1839); *Skeleton of a Course in Theology* (1841); *Lectures on Systematic Theology* (1851); *Sermons on Gospel Themes* (1876). He died at Oberlin, Ohio, Aug. 16, 1875.

FINSCH, Friedrich Herrmann Otto, a German traveler and scientist; born at Warmbrunn, Silesia, Aug. 8, 1839. After holding a position at Rustchuk, under the Austrian consul, where he had an opportunity of gratifying his taste for the study of natural history, he was assistant in the museum at Leyden, Holland, from 1861 to 1864, after which he was made director of the Bremen Museum of Natural History and Ethnology. He accompanied Dr. Alfred Edmund Brehm in his expedition of 1878 through western Siberia, to explore the mossy plains lying between the River Obi and the Gulf of Kara to ascertain the practicability of connecting the tributaries of the rivers Obi and Kara by a canal, the expedition being under the auspices of the Bremen North Polar Exploration Society. Dr. Finsch spent the next four years in Australia, New Guinea and the islands of the Pacific, making valuable collections for the Humboldt Society of Berlin. It was while on his journey to Australia, via New York City, that he delivered, in sound condition, a consignment of live German carp to the United States Fish Commission. After an interval of two years, Dr. Finsch again visited New Guinea, exploring and making a survey of Vulcan Island to Humboldt Bay, which was followed by the establishment of the German protectorate known as Kaiser Wilhelmsland. His works include *Monographie der Papageien* (1870); *Die Vögel Ostafrikas*, with Dr. Carl Johann Gustav Hartlaub (1870); *Die Zweite Deutsche Nordpolarfahrt* (1873); *Anthropologische Ergebnisse Einer Reise in der Südsee* (1884); *Verzeichniss Einer Sammlung von Maori Antiquitäten auf Neuseeland* (1884); *Über Bekleidung, Schmuck und Tätowierung der Papua auf der Südostküste von Neuguinea*, with illustrations (1885); *Ethnologische Erfahrungen, etc., aus der Südsee*, three parts (1888, 1891, 1893); *Ethnologischer Atlas, Typen aus der Steinzeit Neuguineas* (1888).

FINSTERWALDE, a small town of central Prussia, in the province of Brandenburg; situated on an affluent of the Black Elster, 40 miles N. of Dresden. It has manufactories of cloth and machinery; spinning and weaving are also carried on. Population, 7,371.

FIORELLI, Giuseppe, an Italian archæologist; born in Naples, June 8, 1823. From 1845 until 1849 he was in charge of the excavations at Pompeii. In 1860 he was made, by Victor Emmanuel, chief director of the operations, and also director of explorations of the whole kingdom. In the same year he was appointed professor of archæology in the University of Naples, and in 1862 director of the national museum in the same place. He was elected a Senator in 1865.

FIRE-ALARMS. A modern fire-alarm telegraph consists of a central station where batteries are maintained, wire circuits connecting this station with the street signal-boxes, and the alarm apparatus, including, usually, a bell-striker in a tower and gong-strikers in engine-houses, etc. Within a few years many improvements have been introduced in the way of perfected automatic apparatus for the central station. One of them is the Gamewell automatic non-interfering repeater, which is so arranged that a signal sounded on one circuit is instantly repeated on all the others. An accidental signal caused by a break in the wire of a circuit only sounds one stroke, when it is thrown out of service, the other circuits remaining in operation. If a battery weakens, or the current on a circuit is interrupted in any manner, the one stroke of the bell-striker gives notice of the difficulty, so that it actually protects the efficiency of the entire system. The Gamewell Company have also introduced an improved signal-box, which is so guarded that two alarms cannot be sent in together and become mixed, as is possible with the older systems.

Those in use in Philadelphia are arranged to rewind by means of the pulling down of the lever that sends each alarm of fire. As a result, they are always in working order.

In 1895 the Franklin Institute of Philadelphia awarded a medal to the Goldstein pneumatic fire-alarm system, which is designed to protect factories and large buildings. The apparatus consists of a thermostat that may be influenced by the heat of a fire near by; an annunciator, receiving an alarm from the thermostat, and operating a visual floor-signal and also a bell; a transmitter, to send an alarm to the nearest engine-house. The whole system is connected by inclosed pipes, which may be laid within a building in the ordinary manner. The thermostat has disks, which remain in place until subjected to a temperature of 150° F., when the solder that holds them melts, and the disks fall apart, releasing a rod and spring, which drive a cylinder in the pipe, causing an air-pressure that affects a sort of bellows in the receiver or annunciator. When the bellows is operated, a mechanical gong is sounded and a shutter is dropped, displaying a sign indicating the room or floor on which the fire has occurred. A local alarm, wound to run for fifteen minutes, is also set in operation. The annunciator and local alarm are intended to be placed at the main entrance of a building, to attract the attention of passers-by and to notify any one investigating as to the part of the building in which the fire has started. The transmitter is a magneto-electric machine, and the impulse of air from the thermostat releases a weight, that causes the transmitter to send an alarm to the engine-house, central telephone station, or the like. A wheel geared to the armature of this machine is furnished with contact-springs, by means of which the number of the installation at the factory is telegraphically indicated at the exchange.

C. H. Cochrane.

FIRE-ARMOR, appliances fitted for use in burning buildings to facilitate escape, or the use of fire-extinguishing apparatus, and for work in mines filled with choke or fire damp. It is of two kinds. In one the wearer breathes from a supply of compressed air carried in a suitable reservoir; in the other, the air is filtered through some porous substance, moistened and interposed between the wearer and the atmosphere. The efficacy of each has been proved beyond dispute. An esteemed invention is that of George Crofutt, from 1873 to 1874, termed the "eye and lung protector," a species of mask held over the face by an elastic band passing around the head. It weighs but a few ounces, and may be instantaneously fitted into place. The wearer breathes through a moist sponge contained in a porous cotton bag, which not only cools the air passing through it, but also eliminates dust, noxious gases, foul odors, etc. The eyes are protected by plates of transparent mica inserted in a duplex steel shell, so covered and edged with rubber as to exclude smoke and dirt.

FIREARMS. See Guns and Gunnery, in these Supplements.

FIRE-BRICK. See Fire-clay, Vol. IX, p. 238.

FIRE-CRACKERS, a species of fireworks, of Chinese origin, consisting of a small sealed paper cylinder charged with gunpowder, and provided with a string fuse, by which it is exploded. The smallest fire-crackers are about two and one half inches long, the largest running to a foot and longer. The tube is made of strawboard; the fuse is of spun cotton, which is soaked in a mixture of starch and fine gunpowder. The explosive mixture consists of powdered charcoal, bichromate of potash and chlorate of potash; this mixture is used for squibs, devil-chasers and explosive pin-wheels. Fire-crackers, which formerly all came from China, are now extensively manufactured in the United States. The process is simple.

The pasteboard is cut into strips, which, when rolled up, make a cylinder of the required diameter, and consisting of several thicknesses of pasteboard. Ten-inch fire-crackers are about two and one half inches in diameter. They are rolled into hollow tubes by machinery. The bottom of the tube is plugged with a piece of cork, pith or pasteboard, the top is plugged with clay or wood-pulp, and through the clay is carried the fuse, which is put in position first. This is accomplished by slipping the tube over a hollow pin, which is about three quarters of an inch shorter than the tube. Each pin has a round hole, through which the fuse is stuck. This enables the maker to have the clay packed closely down on the head of the pin and around the fuse.

The explosive compound is next dropped into the tube, and the end plugged with a piece of cork or other material. The crackers are then covered with red paper and laid aside to dry, ready for use.

FIREDAMP. See Coal, Vol. VI, pp. 72–74, 79.

FIRE DEPARTMENT AND APPARATUS, Recent Improvements in. The steam-engines of later years vary materially in construction. In one type, the boiler has inch tubes depending from its roof, like stalactites, down into the fire; thus the water in them gets the full benefit of the heat. In another, small groups of tubes are hung like tiny steam-radiators to the roof of the fire-box, and connected with the side of the box as well, so that the water circulates up through a nest of small tubes; a third type has a coil of water-pipe running around the fire and down into the side of the fire-box. Each type has its advocates. A feature not generally known is the water-tank for supplying the boiler. It is generally located under the driver's seat, and is used only when the engine is pumping salt or foul water.

The most powerful land engines have two steam-cylinders, capable of throwing solid water through a two-inch nozzle two hundred feet over level ground.

The hose is usually carried on a reel or spool, supported on two or four wheeled vehicles, or the hose may be laid flat on the bed or box of a sim-

ple four-wheeled truck. In practice it is found that a hose so applied can be stretched for work more quickly, and when the fire is out can be loaded more readily.

A Water-Tower consists of an iron tube so pivoted over one end of a truck that its top may be raised to a height of sixty feet above the street pavement. The upper end of the pipe ends in a nozzle, controlled by a man on the truck. Two, three or four engines may be coupled at the base and their united streams forced through the pipe and out at the nozzle. They send a solid two-and-a-quarter-inch stream through the top windows of a six-story building with ease. The earliest towers were put in position by man-power; the later ones are raised by carbonic-acid gas, generated in a retort suspended near the rear axle of the truck, and acting upon the piston-rods of two cylinders, very like steam-engine cylinders. The gas is quickly generated, and in sufficient quantity to exert a pressure in the cylinder of over one hundred pounds to the square inch. A derrick is raised over the forward wheels of the truck, and with the aid of this derrick the pipe is rapidly brought into a perpendicular position by means of a metal rope working over pulleys, and a hand-winch.

The hook and ladder trucks usually carry 10 ladders, varying in length from 10 to 75 feet. Some are 92 feet long. These longest are permanently fixed to turn-tables on the trucks that carry them, and are raised by cranks, screws and pulleys.

By their use, persons on the tops of buildings or in the upper stories can be quickly and readily swung over onto the roofs of adjoining buildings, or across the street, to a place of safety.

Scaling-Ladders are unique contrivances, and consist of a single rod, with rungs passing through or bound to it, and a hook with reach enough to grasp any wall over the window-sill. Scaling-ladders are of the greatest benefit in securing an entrance to a building through the windows, and in rescuing lives. The fireman raises the ladder, drives the hook through the window of the first story, and catches it over the sill; climbs up, throws his leg over the sill, and lifts the ladder to the next story. If he discovers that the window immediately above is so full of flame that he cannot use it, he reaches with his ladder for one on either side, then swings loose, vibrating like a pendulum. He goes in this way to the proper height, when he lowers a cord to the ground, to which a life-line is attached, and people who could not otherwise escape are safely lowered.

Throwing a Line with a Rifle is a novel device for quickly reaching the top of a building. A smooth-bore Remington gun with a ten-inch wound barrel is used. The projectile is a long pear-shaped cap, that fits over the muzzle, with the end of a light line fixed fast to a ring in its base. A blank cartridge does the work. The line goes upward a distance of two hundred feet, and when it falls is caught and used to draw up the heavier line.

If the fire be such that the life-line would be burned, and thereby be rendered worthless, there is provided a wheel-shaped net, made of slender ropes, and of 10-feet diameter. It is held by as many determined men as can get hold of it. When ready, they call upon the person in peril to jump, who, with no prospect but death if he stays, rarely disobeys. While not every one escapes unhurt, there are instances where men weighing two hundred pounds have safely jumped a distance of one hundred feet.

Iron water-pipes fixed to buildings are of the greatest benefit, by reason of being constantly in place. They are put both on the outside and the inside of buildings, according to the preference of the owner, and extend from the street or sidewalk above the roof, and to the cellars and subcellars, where they are especially valuable. On the inside, short branches project from the main pipe, and to these are usually attached the necessary length of hose for protecting that story. Where buildings are thus provided for, it is only necessary to attach the engine-hose to the iron pipe built on or into the house, and the fireman goes within to find everything ready for immediate use. Such pipes are of the greatest use when fires are smoldering in a cellar. The minutes lost in carrying hose through doorways, or breaking openings through sidewalks, have resulted in the loss of many buildings.

The Air-Washer is a device for washing the smoke out of the air in any room, but is especially intended for use in cellars. It is a short section of pipe fitted with a sprinkler, after the manner of a lawn-sprinkler. In its use a hole is cut through the floor, if no other way is found, the washer is passed through, the water turned on, and showers are thrown in all directions.

Floating Engines or *Fire-Boats*, the best of which are built of steel, are about 125 feet in length, 25 to 27 feet wide, and draw about nine feet of water. They are provided with monster boilers and triple-expansion engines. There are two propeller-wheels, one being connected with the rudder and the wheel-shaft in such a way that it swings with the rudder, and aids the boat in turning almost upon her center.

The pumps are in four sets of two each. From them the water is forced into an air-chamber, thence through four standing pipes, which rise through the deckhouse—two forward and two aft. The nozzles at the ends of the pipes are so attached that they control every possible direction in which it may be desired to turn them. The floating engines are kept with fires partially banked, but steam up. At a signal, the fires are raked, the lines thrown off, the throttle thrown open, and the conflagration headed for. At a rate of nearly twenty sea-miles an hour she rushes along, dodging the sea-craft with remarkable ease by reason of the rudder-propeller attachment, and if the fire be at the water's edge, as on a pier or steamer, can run so close that the flames envelop her stem. The whole power of the boilers is quickly turned upon the pumps, with no loss of time, for there is no hose to lay. The force of

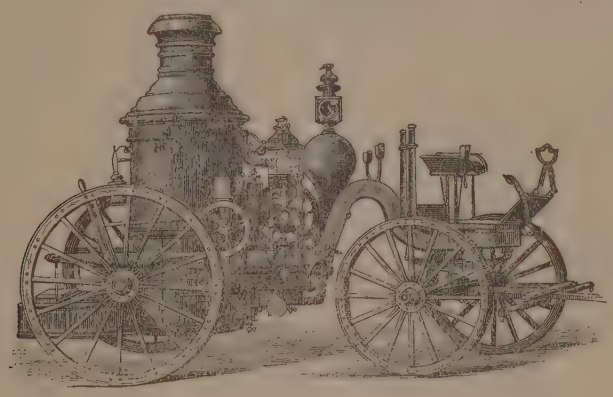
the water driven through the five-inch nozzle is such that it carries all woodwork before it, tears off roofs, and even bursts through brick walls, thus obviating the use of axes.

On these floating engines there are always screens for protecting the men who would otherwise be exposed to the fury of the flames. The screens are made of steel plate, and are double, having an air-space between. Each section is six feet long, and four and a half feet above the rail arching over the deck. Peep-holes to look through, and other holes large enough to direct a small stream through, are also provided. If the decks or any other part of the water-engine become too hot for safety or comfort, the captain, instead of backing the boat out to cool off, turns the water on from skillfully arranged sprinklers, thus protecting the workers while they attend to the greater fire.

The imperial German government has introduced a *fire-proof suit* of such efficiency that a fireman may approach a conflagration, either in a building or on board ship, with comparative freedom from danger. It consists of a helmet, jacket, trousers, boots and mittens. The helmet is constructed of light wicker-work, covered with a composition making it perfectly air and water tight In the front part of the helmet is a glass window, which closes hermetically, but which may be opened and closed by the wearer as may be required. Connected with the helmet are the jacket and hose or trousers, made of water-proof double material. The trousers are supported by leather suspenders. The jacket falls over the trousers at the waist, and is fastened by a belt. The sleeves of the jacket are connected with water-proof gloves. Passing through the back of the helmet is a tube for the conveyance of air, which is distributed by means of smaller tubes throughout the interior around the head of the wearer, thereby keeping the head constantly surrounded with fresh air, and also preventing the accumulations of moisture-cloudiness on the glass, thereby enabling the wearer to see and breathe freely.

The fireman thus encased is further provided with a water-tube, by means of which he is enabled to send a spray of water over himself, as an additional protection against fire or heat. By a special tube he can convey water into the helmet like a douche. Thus protected, he can approach a fire with impunity, is enabled to make his investigations, and more successfully combat the danger, whether in dense smoke or fierce flame. The new costume has been adopted by all the fire brigades in Berlin, and by those of other Continental cities, and has also been provided for all the vessels of the German navy.

In no other field of human activity is the value of time more clearly recognized than in the modern fire department. The fraction of a minute saved in the first attack upon a fire often means the saving of hundreds of thousands of dollars; while not infrequently a human life may depend upon the celerity with which the brave firemen reach the scene of a conflagration with their ladders, life-lines, nets and other life-saving appliances. Every agency known to science for economizing time is utilized. The alarm is sounded by electricity. (See FIRE-ALARMS, in these Supplements.) The same current of electricity which sounds the note of warning in the engine-house releases the fastening of the horses in their stalls. These sagacious animals, thoroughly trained in the performance of their duties, instantly spring to their places in front of the engine. The harness, suspended from hooks overhead, drops upon their backs, where it is quickly fastened with clasps, the doors of the engine-house fly open, and barely eight seconds have elapsed between the sounding of the alarm and the exit of the engine from the engine-house. The sleeping-room of the firemen is on the second floor, directly over the engine. Stairs, which are provided as a means of reaching this room from below, require too much time to descend; hence, large holes are made in the floor, in the center of each of which is a brass rod, reaching to the main floor, down which the firemen slide, in order to save an extra second or two of time. The fireman who should use the stairway, descending it as quickly as he might, would find, when he reached the ground-floor, that the horses were harnessed, the fires lighted and the



STEAM FIRE-ENGINE.

engine half a block away. In order to make steam quickly, the water in the boiler of the engine is kept hot at all times, a stationary boiler in the engine-house keeping the water at a proper temperature when the engine is "at rest."

One of the important adjuncts of the fire department of a great city is a school for horses, where they undergo a thorough and systematic course of education. After months of patient training, only the more intelligent and sagacious horses are assigned to active duty, it being impossible to educate a large percentage of the animals to the requirements of a well-ordered fire department.

Fire-Extinguishers. Of these there is a large variety, each with its advocates. The fire-extinguisher, commonly so termed, is a metal cylinder, with a capacity of about a quarter of a barrel. (See FIRE, Vol. IX, p. 235.)

In some varieties, there are two vessels, one containing a bicarbonate, the other a strong acid, sometimes oil of vitriol. These are contained within a larger cylinder, containing water. When wanted for use, the contents of the two smaller vessels are thrown into the water, carbonic-acid gas is set free, and is absorbed by or dissolved in the water, and the whole is immediately ready for use.

In some machines other agencies are used. By opening a suitable valve in the hose or outlet, the confined gas forces out the liquid in a strong jet, while yet heavily charged with carbonic-acid gas, which, being non-combustible, materially assists the action of the water as an extinguisher.

Another, the Babcock, has its cylinder filled with a solution of bicarbonate of soda, with a vessel of acid suspended in its upper part. This smaller vessel has a stopper, which, being withdrawn, causes the vessel to tilt over, and the escaping acid, mingling with the solution, discharges the carbonic acid under heavy pressure.

The transition from the small extinguisher to one large enough to necessitate carriage by wheels and drawn by horses was easy and natural. In order to provide against the contingency of exhaustion of a cylinder, and the apparatus becoming thereby temporarily worthless, as at large fires, an additional cylinder was added, so that while one is in use, the other may be resupplied with the necessary chemicals.

Grenades, or bombs, are small glass spheres readily fitted to convenient places in halls, rooms, offices, etc., and are intended to be thrown by hand against the portions of the structure on fire, thus breaking the glass and liberating the contents for extinguishing the flames.

FIREFLY, a name applied to many "phosphorescent" insects, which are all included within the order *Coleoptera*, or beetles. Some of them (among the elaters) give forth a steady light, and these may be distinguished as fireflies proper from the glow-worms and "lightning-bugs" (among the lampyrids), which flash light intermittently. In the phosphorescent *Elateridæ*, furthermore, the production of light has its seat more anteriorily than in the *Lampyridæ*, where it is abdominal.

The most brilliant fireflies are species of *Pyrophorus*, most at home in tropical America. One form (*Pyrophorus noctilucus*) common in the West Indies and Brazil, attains a length of about an inch and a half, and has a dark rusty brown color. On the upper surface of the first ring of the thorax are two yellowish oval spots, which are brilliantly luminous during the nocturnal activity of the beetle; while on the first ring of the abdomen a still brighter organ is situated. The luminous organs are special modifications of the epidermic cells, which are disposed in two layers, of which the outer alone is luminous. The luminosity depends on a process of oxidation; the oxygen is supplied by the tracheæ, and the brilliancy varies with the respiratory activity. What the substance oxidized really is remains undiscovered.

The light of these living lamps, or cucujos, as the Mexicans call them, has frequently saved a traveler's life; the Indians "travel in the night with fireflies fastened to their hands and feet, and spin, weave, paint and dance by their light." See COLEOPTERA, Vol. VI, p. 132.

FIREHOLE RIVER, or main fork of Madison River. It flows from Madison Lake northwest through Firehole Basin, one of the most remarkable regions of the National Park, in the state of Wyoming.

*FIRE INSURANCE IN THE UNITED STATES SINCE 1879. The changes in the methods of conducting fire insurance in the United States during the past 15 years have been many, some of them undoubtedly for the better, and on the whole tending toward a more scientific basis for the fitting of the rate charged to the risk assumed. Experience has enabled underwriters to make a better classification of risks, and during the past three years, at least, better results, from the standpoint of the stockholder, have been secured. Better building-construction in the large cities, better care of premises, increased efficiency of fire departments and water-supply, the installation of automatic sprinklers in large mercantile and manufacturing establishments, and vastly improved installation of electric wires used for power or lighting have been brought about by the fire-underwriters. With the introduction and now almost universal use of electricity in its application to light manufacturing, street-car propulsion by the trolley system, and for lighting purposes, general and domestic, a distinct fire-hazard has been developed, formerly unknown. This has, however, been pretty effectually met by the prompt measures taken by the underwriters. In the latter part of 1892 the Underwriters' National Electrical Association was organized, and a system of thorough inspection of risks by experts was inaugurated, and rules applied for the installation of electric wires, and the government of the use of electricity in its various forms, extra charges of premium being made for neglect to observe the prescribed regulations. More recently an electrical bureau, under the direction of the National Board of Fire Underwriters, has been established, with head-

*Copyright, 1897, by The Werner Company.

quarters in Chicago, to which regular descriptive reports are made, by the local boards of underwriters throughout the country, of all fires caused by electric wires, and a classified bulletin issued to all companies and agencies, containing a summary of the information received. Through the efforts of the Electrical Association and the National Board of Fire Underwriters, municipal ordinances governing the use of electricity and providing for systematic inspection have been adopted in very many of the larger towns and in the principal cities.

Classification of Risks, Supervision and Rating. Persistent attempts have been made, with more unanimity than formerly, by the fire insurance managers, for a more accurate classification of hazards, and to devise schedules of rating adequate to meet the distinct hazards of various kinds in different localities. To this end, underwriters' associations, made up of representatives of the leading companies, have been formed since 1880, having general supervision of the business in the various sections of the United States. These associations regulate rates and agents' commissions, in their respective territories, for the companies comprising them, excepting in the principal cities. There are many companies outside the general associations which make rates for themselves, but the great majority of the important companies are "tariff" companies, and adhere to agreed rates. The New England Insurance Exchange, with headquarters in Boston, was organized in January, 1883, and controls rates and commissions for the New England states, with the exception of New Hampshire (which is rated by a state board) and the city of Boston, which is under the supervision of the Boston Board of Underwriters. In 1881 the Underwriters' Association of the Middle Department was organized, its territory now being Pennsylvania, New Jersey, Delaware, Maryland and the District of Columbia. The Southeastern Tariff Association was formed in 1882, and has jurisdiction over most of the Southern states. The Western Union, as it is generally called, has for many years supervised the business of the West and Northwest for the companies composing it, and includes about all the states and territories, excepting the Pacific Coast states, west of the Alleghanies. Until 1895 the Pacific states were supervised, first by the Pacific Insurance Union, and later by the Pacific Board of Underwriters, but since 1895 that territory has been in a disorganized condition.

In New York City and vicinity, rates and commissions are regulated by the New York Tariff Association, while the balance of the state is supervised by the New York State Board. In all the cities and towns of importance, local boards of underwriters exist, subject to the control, through committees and commissions, of the above-named general associations. Diversity of interests and sharp competition have subjected these associations, at times, to a severe strain, but so far they have remained intact and efficient in maintaining adequate rates and regulating commissions. Several states maintain state boards for purposes of general co-operation, but not as rating bodies, as a rule. The Fire Underwriters' Association of the Northwest, having a continuous existence since 1871, is an influential organization, composed of the managers and fieldmen of the West and Northwest, who meet annually in convention at Chicago as a free parliament for the discussion of insurance topics, and has been of great service as an educator, but studiously refrains from attempting the exercise of supervisory functions. Of a similar character is the Underwriters' Association of the Pacific, meeting in San Francisco. The National Board of Fire Underwriters, with headquarters in New York, for a time attempted the exercise of general supervisory and rating functions, but for several years past has confined its work to the gathering and dissemination of statistical information, the inspection and improvement of fire departments, improved building construction, the detection of incendiaries, and a better system of electrical installation. Its work is broadly educational and suggestive. The work of the various supervising and rating associations above named has, it is claimed, resulted in a better classification of risks and a more scientific system of schedule rating. In the hazard on manufacturing risks, great improvements have been brought about during the past few years, through the methods adopted by the "mill mutuals" of New England. These companies were formed almost exclusively for the insurance, on the mutual plan, of cotton and woolen mills and kindred establishments, and have adopted a system of exceedingly stringent regulations for the mill-owners, involving the most approved construction of buildings and machinery, extra watchfulness of premises, internal fire-extinguishing devices and domestic fire brigades, with ample water-supply, and numerous other safeguards unnecessary to mention. The large stock companies, also, have factory insurance associations, operating under similar conditions; and as the result of this system of inspection and extra protection, the fire loss, and consequently the rate, has materially decreased on the class of risks named.

Insurance Supervision and Legislation. One of the peculiar experiences to which American insurance companies are subjected, to a great extent unknown in other countries, is a system of supervision, under a more or less intricate code of laws, administered by an insurance commissioner in each of forty-five states, in which there is great diversity of requirements. In several of the older and more important states there is uniformity in some of the regulations adopted to govern insurance companies, such as amount of capital required, license fees and standard form of policy to be used; but in a score of features the laws are widely different and constantly changing. At each session of the state legislatures numerous new bills or amendments to old laws are introduced pertaining to the supervision of insurance,

many of which the companies regard as hostile to their interests. In a few states, somewhat recently, "anti-combination" laws have been passed applying to insurance, prohibiting the existence of tariff associations, state boards and compacts of any kind designed to fix rates. In other states, special taxation of premiums for the benefit of fire departments has been prescribed; while in fourteen of the states "valued-policy" laws are now in force, providing that the full amount named in the policy, whatever the actual value of the property insured, must be paid in cases of total loss. In some cases the clause in policies, extensively used for some time past, called the "eighty per cent co-insurance clause," has been prohibited by statute. The clause provides that unless the owner carries insurance equal to eighty per cent of the value of the property, he shall become a co-insurer for the deficiency. Spasmodic efforts have been made during the past dozen years by the state insurance commissioners, who meet annually, to secure greater uniformity in the laws of the several states governing insurance, but without much success.

Classes of Companies. The great bulk of the fire-insurance business in the United States has always been transacted by joint-stock companies, of which, at the close of 1895, there were about 260 American and 26 foreign companies, 20 of these being British, two Canadian and the other four German companies. The American companies are of varying degrees of financial strength, the cash capital ranging from $100,000 to $4,000,000 each, and the assets from $150,000 to $10,000,000. The foreign companies are required to deposit $200,000 with the insurance department of some state and to place $500,000 in the hands of American trustees as a condition precedent to commencing business in this country. When a company complies with these requirements by entering one of the principal states, the commissioners of the other states (with two or three exceptions, where a special deposit is required) admit it to do business on the same terms as are applied to a domestic company of another state. As a matter of fact, most of the foreign companies are first admitted to New York state, though several have first been authorized elsewhere. Since 1892 a class of combinations have sprung up, mostly in New York, offering fire insurance protection under the name of the "Lloyds." These are simply associations of individuals, each of whom becomes responsible for a definite amount, and who jointly appoint an "attorney," who acts as the insurance manager of the concern. These combinations have, as a rule, refused to report or become amenable to the state insurance departments, claiming immunity from supervision on the plea of "individual rights." A large number of these "Lloyds" have appeared during the past two years, and they have transacted a very considerable business. At this writing (June, 1896), the authorities of the state of New York have pending vigorous legal proceedings against a large number which have been doing business, it is claimed, in violation of a law formed expressly to apply to this class of insurers. The immediate result is the cessation of business by the class affected, though a small number of Lloyds financially strong and obedient to legal requirements continue successfully in the field. There has always been a large number of mutual fire insurance companies in this country, ranging in importance from the "township mutual," as a local affair, to the company seeking business in an entire state, or in several states. The number has widely varied at different periods, hundreds having disappeared during the past decade, and many new companies coming into existence. The most stable and the strongest of the mutuals are the mill mutuals of New England, above referred to. In 1895 the number of mutuals, not including any of the township mutuals, or others purely local, was about two hundred, altogether writing probably about one twentieth in amount of the risks written throughout the country by all companies.

Statistics of the Business. The growth of property values, and he consequent increase of the insurance area in the United States, has been rapid, but insurance facilities have increased in about the same proportion. Comparing 1880 with 1895, the number of companies in existence shows a decrease, but the assets reported show a large increase. In 1880 the total assets of all classes of companies, home and foreign (the assets of the latter being only those held in the United States), amounted to $216,000,000, in round numbers, and in 1895 to $350,000,000. The capital of the stock companies has been exceedingly variable: reported at a little over $73,000,000 in 1880, at $93,000,000 in 1885, decreasing to $85,000,000 in 1890, and to $70,000,000 in 1895. The number of American stock companies was about 295 in 1880; in 1885, about 270, rising to 325 in 1890, and decreasing to 260 in 1895. Concentration has of late years been the order of the day, fewer companies transacting the business, many of the smaller companies being crowded out. It is estimated that since 1875 about 265 companies have retired, most of them reinsuring with other companies, causing the withdrawal of about $50,000,000 of capital. A considerable number has failed outright, while a good many new companies have come in to supply the vacancies made. The number of foreign companies has not varied materially, those doing business ranging from 23 to 27 each year since 1880, but their operations have steadily grown in importance, as indicated by the fact that their assets in the United States have increased from $27,392,000 in 1880 to $61,260,973 in 1895, and that the volume of risks written has increased in proportion.

STOCK COMPANIES (INCLUDING FOREIGN).

Year.	Nos. of Cos.	Insurance Written.	Premiums Rec'd.	Losses Paid.
1880	319	$7,822,655,000	$62,793,575	$36,858,495
1885	304	10,645,250,500	99,265,600	53,650,800
1890	350	13,602,300,000	115,235,075	61,791,350
1895	285	15,068,250,000	139,350,200	74,156,400

The record of the mutuals (excluding township and other obscure local companies) has been, as nearly as can be ascertained, as follows:

MUTUAL COMPANIES.

Year.	No. of Cos.	Insurance Written.	Premiums Rec'd.	Losses Paid.
1880	275	$630,600,500	$5,760,000	$3,508,550
1885	200	450,560,000	4,665,000	2,530,220
1890	192	535,300,250	15,870,325	8,256,500
1895	203	660,400,000	17,230,425	9,390,386

The above tables indicates the trend of the business since 1879 in the entire country, as transacted, respectively, by the joint-stock and mutual companies.

The grand total for 1895 for all stock companies and mutuals combined was: Risks written, $15,728,250,000; premiums received, $156,580,425; losses paid, $83,546,786. The average ratio of losses to premiums from 1880 to 1895, inclusive, has been about 58 per cent. The rate of premium charged has varied from 86 cents on each $100 of risks in 1880 to $1.02 in 1885, standing at $1.00 in 1890, and increasing to $1.08 in 1895. The rate question is the ever-present one in fire insurance, and will continue to be, as it has been, subject to marked variations from a variety of causes.

A. H. Huling.

FIRE ISLAND, a small island in eastern Great South Bay, Long Island, belonging to Suffolk County, New York. It is a favorite summer resort. Fire Island Beach, 30 miles long, with a fine lighthouse, separates Great South Bay from the Atlantic. Fire Island has served as a special quarantine station to prevent the invasion of cholera.

FIRE-PROOF BUILDING. See Architecture, in these Supplements.

FIRESHIP, in maritime warfare, a vessel filled with combustibles, which was sailed into the midst of an opposing fleet, set on fire, and abandoned with destructive intent.

FIREWORKS. See Pyrotechny, Vol. XX, pp. 134–136.

FIRE-WORSHIPERS. See Parsis, Vol. XVIII, p. 327; Hestia, Vol. XI, p. 782.

FIRKOWITSCH, Abraham, a Jewish archæologist; born at Lutzk, in the Crimea, Sept. 27, 1786. He was a Karaite, and devoted himself to collecting manuscripts and works in support of the teachings of the Karaites. He published accounts of his work in *Massa-u-Meriba* (1838) and in *Abne-Likkaron* (1872). His collection of manuscripts went to the imperial library at St. Petersburgh. He died at Tshufut-Kale, in the Crimea, June 7, 1874. See Karaites, Vol. XIV, p. 2.

FIRMAN, a word of Persian origin, signifying an order, used by the Oriental nations for any permit to travel or do business, and by the Turks to denote any official decree emanating from the Ottoman Porte. The right of signing any firman relating to affairs connected with his special department is exercised by every minister and member of the divan; but the office of placing at the head of the firman the *thograï*, a cipher which contains the name of the sultan in interlaced letters, and which alone gives effect to the decree, is committed to the hands of a special minister, called *nichandji-effendi*.

FIRST-BORN (Heb., *bekor;* Gr., *prototokos;* Lat., *primogenitus*), in Scriptural use, the first male offspring, whether of man or of other animals, due to the Creator, by the Mosaic law, as a recognition of his supreme dominion. The first-born male child, being devoted from the time of birth to God, was to be redeemed within one month after birth by an offering not exceeding in value five shekels of silver (Exod. xiii, 13). The headship of the family was vested in the first-born son by the Mosaic law, and he had a double portion of the inheritance. See, for other laws and usages not Scriptural, Primogeniture, Vol. XIX, pp. 733 et seq.

FIRST-FRUITS, that portion of the fruits of the earth which, by the usage of the Jews and other ancient nations, was offered to God as an acknowledgment of his supreme dominion, and as a thanksgiving for his bounty. See Tithes, Vol. XXIII, p. 411.

FIR-WOOL, a fibrous substance prepared to some extent from the leaves of various species of the genera *Pinus* and *Abies*, and made into cloth, which is believed to be useful in the treatment of skin diseases. Fir-wool extract and fir-wool oil are prepared from leaves of the same species.

FISCHER, Ernst Kuno Berthold, a German philosopher; born in the Silesian village of Sandewalde, July 23, 1824; and educated at Posen, Leipsic and Halle, taking his degree of Ph.D. at the latter place in 1847. In 1850 he became a privat-docent of philosophy at Heidelberg. Suddenly, however, in 1853, presumably because of private charges of pantheism made against the first volume of his *History of Modern Philosophy*, the Baden government, without explanation, deprived him of his position. In 1856 he received a call to the chair of philosophy at Jena, where he remained until 1872, in which year, Zeller having succeeded Trendelenburg at Berlin, he obtained Zeller's post at Heidelberg. Fischer's chief work is his *History of Modern Philosophy* (1852–77). His other great philosophical achievement is his *System of Logic and Metaphysics* (1852; new ed. 1865). Of his smaller works, the most noteworthy is a *Critique of Kant*, which, like *Descartes and His School*, has been translated into English.

HAMILTON FISH.

FISH. See Ichthyology, Vol. XII, pp. 630–695.

FISH, Hamilton, an American statesman; born in New York City, Aug. 3, 1808. In 1827 he was graduated at Columbia, studied law, and was admitted to the bar in 1830. In 1842 he was elected to Congress as a Whig, serving until 1845. In 1847–48 Mr.

Fish was lieutenant-governor, and from 1849 to 1851 governor, of the state of New York. In 1851 he was elected United States Senator. After 1857 he spent several years in Europe, and in 1869 was appointed United States minister to France. Under the administration of President Grant, Governor Fish was appointed Secretary of State, which office he filled for two terms with signal ability, settling several foreign disputes to this country's advantage, among them the famous *Alabama* claims, and the *Virginius* question with Spain. He died in Garrison, N. Y., Sept. 7, 1893.

FISH, NICHOLAS, an American soldier, father of the preceding; born in New York City, Aug. 28, 1758. In 1776 he became an aide-de-camp; the same year major of brigade, and then major of the Second New York Regiment. At the close of the Revolution he was a lieutenant-colonel, and in 1786 became adjutant-general of New York state, holding the office for many years. In 1794 he was supervisor of revenue under Washington, and in 1806–17 was a New York alderman. He died in New York, June 20, 1833.

FISH-CULTURE. For a general historical discussion, see PISCICULTURE, Vol. XIX, pp. 126–129. Fish-culture in the United States is under the jurisdiction of the United States Fish Commission. This commission is a bureau established by act of Congress of Feb. 9, 1871. The executive work of the bureau is in the hands of the Commissioner of Fish and Fisheries. The object of the establishment was to investigate the condition of the food-fishes of the sea-coast and inland waters of the United States. The offices of the bureau have gradually been extended, until the commission now supervises the propagation and distribution of useful fishes, and promotes the fishing industries of the country. The bureau is now one of the most important of the government service. From a single commissioner it has grown into four divisions for carrying on the work —the divisions of administration, of inquiry respecting food-fishes, of statistics and methods, and of fish-culture.

In the division of administration is included the department of publications, which, in 1893, distributed 2,700 bound volumes of reports and bulletins and about 11,000 copies of separate treatises. Every state in the Union is entitled to an allotment of fish and fish-eggs for culture. During 1893 19 states received such supplies, and in 1892–93 there were distributed of the various kinds of fish a total of about 180,000,000 eggs and fish, divided as follows: 12,000,000 eggs, 165,000,000 fry and 1,500,000 adult fish. Fish-hatcheries and stations are maintained as distributing-points in various sections of the country. Fish-culture is carried on by the authorities of almost every state. In a number of states a special officer, entitled the fish commissioner, is appointed by the executive and paid by the state for his services. The duties of this officer consist mainly in the enforcement of the laws enacted by the legislature for the protection of the fish. Fishing with seine is forbidden in most states, and in some cases the time for the catching of certain fish is limited by law.

FISHER, FORT, a Confederate fortification for the protection of Wilmington, North Carolina, during the Civil War. It was situated on an embankment at the mouth of the Cape Fear River, and was, in the fall of 1864, the only fortification of importance remaining to the Confederacy. Early in December, 1864, the Union generals decided to assault it by a combined military and naval attack. Accordingly, December 15th, an attack was made by General Butler and Admiral Porter. They were repulsed on the land side, and the project abandoned for the time. Again, on January 13th, an attack was made, General Terry in command of the land forces. This was successful. The loss to the Union was 646 killed and wounded; to the Confederacy, 217 killed and wounded, and 2,083 made prisoners.

FISHER, GEORGE JACKSON, an American physician; born in Northcastle, New York, Nov. 27, 1825. He began practice in 1849, and in 1853–54 was physician and surgeon to the New York state prison at Sing Sing. For twenty years he was United States examining surgeon, and in 1874 was president of the State Medical Society. He wrote many works on anatomy, surgery and medicine, among the chief of which are *Animal Substances Employed as Medicines by the Ancients* (1862); *Teratology* (1875); and *History of Surgery* (1886). He died in Sing Sing, New York, Feb. 3, 1893.

FISHER, GEORGE PARK, an American theologian; born in Wrentham, Massachusetts, Aug. 10, 1827. After his graduation from Brown University in 1847, he studied theology at Yale Divinity School and at Andover, and in Germany; was called to the professorship of divinity in Yale; and from 1854 to 1861 was pastor of the college church. In the latter year he was chosen professor of ecclesiastical history in Yale Divinity School. In 1866 he became one of the editors of the *New Englander*. He was author of numerous works on ecclesiastical topics, those especially worthy of mention are *The Beginnings of Christianity* (1877); *The Christian Religion* (1882); *History of the Christian Church* (1888); and *Colonial History of the United States* (1892).

FISHERIES QUESTION, THE. For a summary of the fisheries dispute between Canada and the United States up to 1887, see FISHERIES, Vol. IX, pp. 268, 269. In 1887 a conference was arranged, to be held at Washington, at which all vexed questions should be discussed, and, if possible, some amicable and lasting conclusion arrived at with regard to outlines and boundaries, modes of preventing unjust seizure and detention of vessels, the question of obtaining bait and supplies, and also the question of payment of damages resulting from wrongful acts of officials. The members of this conference were Sir Charles Tupper, Canadian plenipotentiary; the Right Honorable Joseph Chamberlain, British commissioner, and Sir Lionel Sackville West, the British Minister at Washington, representing British

and Canadian interests, while Secretary Bayard, William L. Putnam of Maine and President James B. Angell of Michigan University associated to guard American interests. The conference was opened in Washington in November, 1887, and on Feb. 15, 1888, a treaty was signed, subject to ratification or rejection by the United States Senate within two years. It was rejected by that body on Aug. 21, 1888. Under the *modus vivendi* clause of the treaty, however, the Canadian government continued to grant licenses to United States fishermen, which, in 1890, numbered 119, costing $14,461. In 1895 47 licenses were granted, costing $5,570. In November, 1895, the section (14) of the acts of 1888 under which the licenses were granted was declared, by the Canadian government, to be without force and no longer operative. Licenses for 1896 were granted under an old act of the Canadian Parliament. For an account of the Bering Sea fisheries question, see BERING SEA QUESTION, in these Supplements.

FISHERY LAWS. By the common law, the owner of the soil on streams or bodies of water is entitled to the exclusive right to fish in such waters. The owner, therefore, of the adjacent land on both sides of a stream enjoyed the sole right to fish in the stream within the limits of the boundary of his land, and the owner of the land on one side had the same right, but only to the exact center of the stream. This common-law right still prevails in the United States, except where restricted by statute or by well-defined local custom or usage. This right is so well established as to streams which are not navigable as to be the subject of separate transfer, but the right will pass with the land, unless specifically reserved. On navigable streams the owner's rights are subject to the right of navigation by the public, and no obstructions will be permitted which will prevent the free use of the stream as a highway for boats. The right of fishing in the sea, or in any bay or arm of the sea, or in tide-waters, belongs to the public in general.

Wherever the owner of adjacent land has the exclusive right to fish in contiguous waters, this right is always subject to the right of the state legislature to regulate the manner in which such right shall be exercised, and such owner has no right to obstruct the free passage of fish along such waters. The legislature may prohibit fishing, except at certain periods of the year, even in private bodies of water. By act of Congress the office of Fish Commissioner is created, and a similar office is provided for by statute in many of the states. The duties of such officer are to prosecute investigations to ascertain any diminution of food-fish in lakes and other coast waters, and report any failure of the supply thereof to the legislative body. Such officers in the various states are empowered to keep the stock of food-fish replenished in waters within the state. It is generally agreed, in international law, that the exclusive right to take fish in the sea over which a nation has jurisdiction belongs to the subjects of such nation for a distance of three miles, or at most within the range of a cannon-shot, from the shore. These rights, however, are frequently regulated by treaty. Many controversies have arisen between Great Britain and the United States relative to the fishery rights along the northern shores of the British possessions in America, but these rights have now become quite well defined by treaty.

FISH-HAWK. See OSPREY, Vol. XVIII, p. 56.

FISHKILL-ON-THE-HUDSON OR FISHKILL LANDING, a village of Dutchess County, southern New York, on the New York Central and Hudson River railroad, 50 miles N. of New York City. It has good public schools, a hat factory, machine and boiler factory and an insecticide factory. Historically, Fishkill is full of interesting associations. The district was purchased from the Indians toward the end of the seventeenth century. By the time of the Revolution the whole district was well cultivated, populous and prosperous, with a community mainly Dutch and English. Fishkill village served as the meeting-place of the provincial convention, and held the patriots' treasury and state archives. It was one of the principal camps for the American army, and in the Verplanck House was framed the constitution of the Society of the Cincinnati. The Beacon Hills, northeastward of Fishkill, were used as alarm-posts in the struggle for freedom. Population 1890, 3,617.

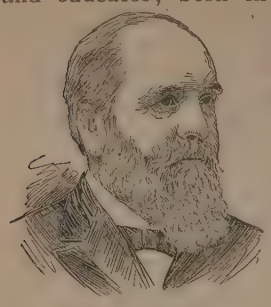
FISH-LOUSE, a name applied to any of the copepod crustaceans which occur as external parasites, both on fresh-water and marine fishes.

FISHPLATES. See RAILWAY, Vol. XX, p. 242.

FISHWAY. An improved form of fishway, or fish-ladder, was exhibited at the Columbian Exposition in Chicago by the Pennsylvania State Fish Commission. It has been patented by William H. Rogers, and is in use in numerous rivers in Pennsylvania, New York, Canada and elsewhere. Its introduction has been very successful in causing shad to ascend dams that previously blocked the rivers above. Many rivers in Nova Scotia have been populated with gaspereaux and salmon through the medium of these fishways. Their construction is simple, consisting of a sluiceway five feet wide and three deep, running through the dam at a grade of one foot in ten, and provided with a series of fences or buckets, set alternately in either side, in such a manner that several inches of water are maintained throughout the whole of the sluiceway. Only a small quantity of water is let in from above, and its force is reduced to a minimum by the obstructions caused by the fences, which form a series of little pools. This sluiceway is made quite strong with timber cribwork, bolted to the bedrock and to the dam, and ballasted with stone. Provision is made for the admission of light, so that the fish may be attracted to the sluiceway. The head of the fishway is sloped so as to turn away floating ice, and a breakwater is usually arranged to keep it free from *débris*.

C. H. COCHRANE.

FISK, Clinton Bowen, an American soldier and educator; born in Greigsville, New York, Dec. 8, 1828. In 1830 he was taken to Michigan, where his father founded the town of Clinton. He was educated at Albion and Ann Arbor and afterward settled in business at Coldwater, Michigan, and St. Louis, Missouri. He entered the army in 1861, rose rapidly to the rank of brevet major-general, and was commander of the Missouri district. After the war he was a commissioner of the Freedman's Bureau, and founder of Fisk University at Nashville, Tennessee, for colored men and women, with which he remained as president until his death. From 1874 until his death he was president of the Indian Commission. He was prominently connected with many educational and religious institutions. In 1888 he was the candidate of the Prohibition party for President of the United States. He died in New York July 9, 1890.



CLINTON B. FISK.

FISK, James, an American jurist; born about 1762. He received no school education; but studied law and practiced in Vermont. In 1805 he was elected a member of Congress and served until 1809, and again from 1811 to 1815. He was chosen a judge of the Vermont supreme court, and in 1817 a United States Senator. In 1818 he resigned his Senatorship and received the appointment of collector of customs for the Vermont district, serving eight years. He died in Swanton, Vermont, Dec. 1, 1844.

FISK, Wilbur, an American clergyman and educator; born in Brattleboro, Vermont, Aug. 31, 1792. He graduated from Brown University in 1815, was licensed to preach in the Methodist Episcopal Church in 1818, and from 1823 to 1827 was presiding elder of that part of Vermont east of the Green Mountains. In 1826 he was chaplain of the Vermont legislature, and from 1826 to 1831 was principal of the Wesleyan Academy in Wilbraham, Massachusetts. In 1830 he was elected the first president of Wesleyan University, Connecticut. He died in Middletown, Connecticut, Feb. 22, 1839.

JOHN FISKE.

FISKE, John, an American historian and evolutionist, was born at Hartford, Connecticut, March 30, 1842. His early years were spent at Middletown, Connecticut, until he entered Harvard University, from which he graduated in 1863, taking thereafter a course in law at the same institution, though he never practiced. At Harvard he was for some years lecturer on philosophy, instructor in history and assistant librarian. As an author, he won his first audience as an expounder of the doctrine of evolution, which brought him the recognition of both Darwin and Herbert Spencer, while he enhanced his fame as an ardent student of American history. On these two notable topics he lectured generally and wrote industriously. In the winter of 1879–80 he delivered in London a series of lectures on American history, first at University College, and afterward at the Royal Institution of Great Britain. Returning to this country, he again made Cambridge, Massachusetts, his home, although appointed professor of American history in Washington University, St. Louis, in 1884. His published works fall into the two classes toward which his acute mind early showed a bent — evolution, and its cognate study of religious philosophy, and American history. To both subjects he made many important contributions, the more valuable and imperishable of which relate to the national history, which are treated with masterly ability and with that interest which is the result of laborious study and deep thought, and in this department of letters he established a reputation as being at once the first authority and the ablest exponent. The following are his chief published writings in the two classes referred to: (1) *Myths and Myth-makers* (1872); *Outlines of Cosmic Philosophy, Based on the Doctrine of Evolution* (2 vols., 1874); *The Unseen World, and Other Essays* (1876); *Darwinism and Other Essays* (1879; enlarged ed. 1885); *Excursions of an Evolutionist* (1883); *The Destiny of Man, Viewed in the Light of His Origin* (1884); *The Idea of God as Affected by Modern Knowledge* (1885); *Theodore Parker*, a biography, in the American Religious Leaders Series (1893); (2) *A History of the United States for Schools* (1886); *American Political Ideas, Viewed from the Standpoint of Universal History* (1888); *The Critical Period of American History* (1888); *The War of Independence*, for young people (1889); *Civil Government in the United States* (1890); *The American Revolution, Considered with Some Reference to its Origin* (2 vols., 1891); *The Discovery of America, with Some Account of American Antiquity and the Spanish Conquest* (2 vols., 1892); and *The Beginnings of New England; or, The Puritan Theocracy in its relation to Civil and Religious Liberty* (1893).

FISKE, Minnie Maddern, an American actress; born in New Orleans in 1860, daughter of Thomas Davey, a Southern manager, and Lizzie Maddern, of an English family of stage people. At the age of three she appeared on the stage at Little Rock, Arkansas, as the Duke of York in *Richard III.* Her education was supervised carefully by her mother, who devoted her life to the purpose. Miss Maddern appeared with Laura Keene, in New York, in *Hunted Down;* as Prince Arthur in *King John*, at Booth's Theater; as François in *Richelieu;* as Louise in *The Two Orphans.* She was the original Ralph Rackstraw in Hooley's Juvenile Pinafore Company, and at the age of 16 appeared as Clip in *A Messenger from Jarvis Section*, and continued the success made

therein by appearing in *Caprice*. In 1890 she married Harrison Grey Fiske, editor of the New York *Dramatic Mirror*, and retired from the stage to prepare for a career in more pretentious plays. She was recognized at once as a powerful actress on her reappearance, her later successes being in *Marie Delroche; A Doll's House; A Light from St. Agnes; The White Pink; Cesarine; Divorçons; Tess of the D'Urbervilles;* and *Becky Sharp*.

FISK UNIVERSITY, Nashville, Tenn., a co-educational institution for the higher education of colored persons, founded in 1867 by Clinton Bowen Fisk, after whom it is named, and nominally under the control of the Congregational Church. In 1898 there were 25 instructors, 459 students, and about 6,500 volumes in the library. Inclusive of 1898, 381 had been graduated. The institution has a small endowment, which is augmented by yearly contributions of various benevolent societies. In 1898 its total income was $35,479. The majority of the students are supported by means of the manual-labor department. A complete industrial system is taught, and, in addition to the collegiate course, special instruction in medicine, theology, and normal teaching is given.

FISSIROSTRES, an artificial group of birds, arranged by Cuvier. The name, signifying "cleft beak," refers to the great gape. The group included swallows, swifts, goat-suckers, etc., but the members of the group are now distributed in various orders.

FISTULINA, a genus of fungi, allied to *Boletus*, common on old oaks and various other trees. *F. hepatica*, the "beefsteak fungus," has a red, fleshy, edible body, with red juice, and is much esteemed in some parts of Europe and America as an esculent, being wholesome and nutritious.

FITCH, polecat fur. See FUR, Vol. IX, p. 838.

FITCH, ASA, an American entomologist; born at Fitch's Point, New York, Feb. 24, 1809. He studied medicine, and engaged in the practice of that profession until 1838, when his desire for scientific study led him to devote himself to research in natural history. He was appointed state entomologist of New York in 1854, and his reports on the economic side of his labors are of great value and much sought after. He died in Salem, New York, April 8, 1878.

FITCH, EBENEZER, an American educator, first president of Williams College; born in Norwich, Connecticut, Sept. 26, 1756. After his graduation from Yale in 1777, he was for a time tutor there, and became the principal of Williamstown Academy in 1791. In 1793, when this academy became Williams College, he continued as president. He remained in office 22 years, resigning to enter the ministry of the Presbyterian Church. He died at West Bloomfield, New York, March 21, 1833.

FITCH, JOSHUA GIRLING, a British inspector of schools; born in 1824. He graduated from the University of London, and entered immediately into educational work. From 1852 to 1856 he was vice-principal of the Normal College. He became principal, and in 1863 was appointed a government school inspector. He was active in the service until 1894, when he retired from public life. He was at various times special commissioner, and in 1888 visited America. He published *Notes on American Schools and Colleges* (1888) and a number of essays on teaching.

FITCH, JOHN LEE, an American artist; born in Hartford, Connecticut, June 25, 1836. He studied in Milan and Munich, under the three Zimmerman brothers, Albert, Max and Richard. He returned to his native city and remained there for a number of years, and then removed to New York. Among his paintings are *A Mountain Brook* (1870); *In the Woods* (1876); *Waiting for a Bite* (1874); and *Twilight on John's Brook* (1878). He died in Yonkers, New York, March 23, 1896.

FITCH, SIMON WALBROOKE, an American surgeon; born in Horton, Nova Scotia, Jan. 2, 1820. He studied in Acadia College, Nova Scotia, and in London and Paris, and graduated at Edinburgh University in 1841. He returned to America and practiced successively in New Brunswick, in Portland, Maine, in New York City, and in Halifax, Nova Scotia. During the Civil War he served with the Fifth Corps of the Union army as chief surgeon, and upon his removal to Halifax in 1871 became surgeon for the Provincial Hospital. He is best known on account of his inventions of surgical instruments, which include the dome trocar (1875), handy aspirator (1877), clamp forceps (1882) and the intra-uterine forceps in 1886. He published *Excision of Uterine Tumors* (1862); *Paracentesis, Aspiration and Transfusion* (1886); and other valuable works.

FITCHBURG, a city of north-central Massachusetts, in Worcester County, on the Nookagee River, and on the Fitchburg and New York, New Haven and Hartford railroads. The growth of the city during the last decade has been considerable. A well-equipped fire department has been established, with 60 telegraphic fire-alarm stations. There were, in 1890, 12 churches and 24 school buildings, the latter being valued at $275,000. A public library and art-gallery building costing $90,000 has been donated to the city by one of its public-spirited citizens, and another has given $450,000 for the establishment and endowment of a public hospital. The library contains 22,310 volumes. Manufacturing is carried on extensively, the principal establishments being paper-mills, machine-shops, iron foundries, saw factories, cotton, woolen and flour mills, shoe factories, wood-turning establishments and shirt factories. It has street-railways, electric lights and other modern city conveniences. Population 1880, 12,429; 1890, 22,037; 1895, 26,394. See also FITCHBURG, Vol. IX, p. 270.

FITZGERALD, AUGUSTUS FREDERICK, Duke of Leinster, an Irish nobleman, the third of his title; born in London, Aug. 31, 1791. He succeeded to his title and estates when he was 13 years of age. He took part in British politics as a Liberal, but in Irish politics he was a Conservative. He received the appointment of lord-lieutenant of County Clare, Ireland, in 1831, and was a mem-

ber of the Queen's Privy Council. He died in London, Oct. 10, 1874.

FITZGERALD, Edward, chiefly known as the translator of the quatrains (*Rubáiyát*) of the Persian poet, Omar Khayyám, was born near Woodbridge, in Suffolk, England, March 31, 1809, and died at Mereton Rectory, Norfolk, June 14, 1883. His father, John Purcell, took his wife's family name of Fitzgerald on the death of her father, in 1818, and with the name he assumed the family arms. In 1816 the family, who were in good circumstances, went to France, where they resided for some years, partly at St. Germains and partly in Paris. In 1821 young Fitzgerald was sent to King Edward VI's School at Bury St. Edmunds, and from there he proceeded to Trinity College, Cambridge, where he took his university degree in 1830. At both school and college he formed valued friendships, the more notable of which were with Thackeray, James Spedding (the editor of Lord Bacon's works) and the brothers Tennyson. Another fast friendship was that formed later in life with a grandson of the poet Crabbe, which had much to do in influencing his literary and social career. After a period of travel abroad, Fitzgerald settled down in England to the life of a country gentleman, with ample leisure for reading and study, which began to bear fruit in the 50 s, when he published, anonymously, *Euphranor*, a platonic dialogue on chivalry, and a collection of apothegms, entitled *Polonius*. His scholarly and *dilettanti* tastes at the same time attracted him to Spanish and Persian literature, the immediate fruit of which were his translations of *Six Dramas of Calderon*, and a translation from the Persian of Jámi's *Sálámin and Absál*. Meanwhile, he pursued his reading in Persian, and came across the writings of the astronomer-poet of the eleventh century, Omar Khayyám, whose work so fascinated him that he soon produced a matchless translation of his now famous quatrains. *Rubáiyát* first appeared in its English dress in 1859, but the work took nearly ten years to be at all widely known, and then their thoughtful philosophy, akin to that of Lucretius, and the wonderful felicity of the translation, attracted many admirers, whom later years have largely increased. A second edition appeared in 1868, a third in 1872, and a fourth in 1879—all published anonymously. American editions of the *Rubáiyát* were published in Boston in 1878 and 1888, and in 1884 appeared the sumptuous folio edition, with 56 full-page illustrations and ornamental title by Elihu Vedder. In 1889 Fitzgerald's *Letters and Literary Remains*, a collection of rare charm to men of letters, were edited, in three volumes, by Dr. W. Aldis Wright, and show the manifold gifts of their author as a scholar and poet. Readers of current literature need hardly be told that Fitzgerald was, throughout his life, the intimate friend, and, at times the severe but cultured critic, of the laureate Tennyson.

FITZGERALD, Edward, a Roman Catholic bishop; born in Limerick, Ireland, in 1833. He emigrated to the United States in 1849, and was educated at the Catholic schools—the College of the Barrens, Missouri, and Emmittsburg Mount St. Mary's College. Upon his ordination as a priest in 1857, he was stationed at Columbus, Ohio, where he made his influence so felt that in 1867 he was chosen bishop of Little Rock, Arkansas. There he was active in inducing immigration and establishing various church orders.

FITZGERALD, Oscar Penn, a bishop of the Methodist Episcopal Church South; born in Caswell County, North Carolina, Aug. 24, 1829. He went to California, in 1855–57, as a missionary to the miners, and became superintendent of public instruction there in 1867. In 1872 he was elected president of the Pacific College, Santa Rosa, California. He was chosen editor of the Nashville (Tennessee) *Christian Advocate* in 1878, and was elected a bishop of the Methodist Church South. He published *California Sketches* (1879); *Centenary Cameos* (1885); and *Judge Longstreet: A Life Sketch* (1891).

FITZGERALD, Percy Hetherington, an Irish novelist and lawyer; born in Fane Valley, County Louth, Ireland, in 1834. He studied at Trinity College, Dublin, and was called to the Irish bar, and received the appointment of crown prosecutor on the northeastern circuit. But it is upon his works of fiction that his reputation is based. The most of his writings have appeared in *Once a Week* and *All the Year Round* as serials. He wrote over sixty works; among them, *The Life of Lawrence Sterne* (1864); *Bella Donna* (1864); *Second Mrs. Tillotson* (1866); *Never Forgotten* (1865); *75 Brook Street* (1867); *The World Behind the Scenes* (1881); *Kings and Queens of an Hour* (1883); and *Henry Irving; or, Twenty Years at the Lyceum.*

FITZPATRICK, William John, an Irish writer; born in Griffinrath, County Kildare, Ireland, Aug. 31, 1830. He received his education in Ireland, at both Protestant and Roman Catholic schools, and became a lawyer, and a magistrate for the counties of Longford and Dublin. His fame, however, rests upon his work as a biographer and miscellaneous writer. Two of his later historical works, *Correspondence of Daniel O'Connell: His Life and Times* (1888) and *Secret Service under Pitt* (1892), attracted widespread comment, and placed him among the best of British historians. Others of his works are *Ireland before the Union* (1869); *Irish Wits and Worthies* (1873); and *The Sham Squire and the Informers of 1798* (1866). Died in Dublin, Dec. 24, 1895.

FIVE FORKS, Battle of, fought April 1, 1865, between the Confederates under Pickett and the Federals under Sheridan, at Five Forks, Dinwiddie County, Virginia. It was a decisive battle, being an immediate step toward the capture of Petersburg and the surrender at Appomattox. Grant had decided to move upon Lee's right and cut him off from Petersburg. To this end he sent Warren with the infantry and Sheridan with the cavalry around to the extreme left. Lee had concentrated a large force at Five Forks, determined to hold what he thought the key to

the situation. On May 31st Warren fought the battle of White Oak Ridge with a severe loss. Sheridan attacked the intrenchments at Five Forks, where Pickett's corps was stationed. At first Sheridan was driven back, but, being reinforced the next day, April 1st, by Warren's corps, carried the fortifications, and the entire remaining Confederate force of over 5,000 was captured. The Federal loss was about 1,000.

FLACOURTIACEÆ, a family of plants of a single genus (*Flacourtia*), and consisting of shrubs and small trees, almost exclusively confined to the Oriental tropical regions. Many of the species produce pleasant, sweet or subacrid fruits. The family is sometimes included in *Bixaceæ*, in which *Bixa orellana* of tropical America is the best-known species, the testa of whose seeds yields the well-known orange or yellow dye *arnotto*, or *annatto*.

FLAD, Henry, an American civil engineer; born in 1823, in Bavaria. After his graduation from the University of Munich in 1846, he moved to the United States. He was employed as construction engineer by the Ohio and Mississippi railroad from 1849 to 1861. During the Civil War he served as a private in the Union army and was promoted to the rank of colonel. He has, since the war, been engaged in various engineering works at St. Louis, among them being the park system, water system and the arch bridge over the Mississippi. He served in 1886 as president of the American Society of Civil Engineers, and in 1892 on the Mississippi River commission.

FLAG, The American. Prior to the separation of the American colonies from England, the flags used were generally those of the mother-country; but in 1774 Captain Markoe of the Philadelphia Light Horse used a flag with a canton of 13 stripes. In the latter part of 1775 Dr. Franklin and Messrs. Lynch and Harrison were appointed to consider the subject of a national flag. The result of this conference was a flag like that of the East India Company and the Sandwich Islands—the king's colors, or union jack, representing the yet recognized sovereignty of England, with a field of 13 stripes, alternate red and white, emblematic of the union of the 13 colonies. The new flag was hoisted for the first time, Jan. 2, 1776, over the camp at Cambridge. When independence was determined on, the British jack was dropped, and 13 stars substituted, representing a new constellation. Nothing further of importance was done on the question of a national flag until April 4, 1817, when Congress enacted,—1. That from and after the Fourth of July, 1818, the flag of the United States be 13 horizontal stripes, alternate red and white; that the union be 20 stars, white in a blue field; 2. That on the admission of every new state in the Union, one star be added to the union of the flag; and that such addition shall take effect on the Fourth day of July then next succeeding such admission. The first flag unfurled under the new law was hoisted over the United States House of Representatives, April 14, 1818. The law of 1817 remains unchanged to the present day, the number of stars having increased with the admission of states. See also Flag, Vol. IX, pp. 276–279.

FLAGELLATA. See Protozoa, Vol. XIX, pp. 856–861.

FLAGELLUM, a whiplike appendage of certain infusoria, bacteria, etc., which acts as an organ of locomotion. It may be defined as an isolated and greatly enlarged cilium. See Histology, Vol. XII, p. 4.

FLAGEOLET. See Flute, Vol. IX, p. 351.

FLAGET, Benedict Joseph, a French-American Roman Catholic bishop; born in Contournat, France, Nov. 7, 1763. He was ordained priest in 1788, and in 1792 came to the United States. He was at once sent as chaplain to Vincennes, Indiana, then a military post in the Northwest. From 1795 to 1798 he was a professor at Georgetown College, and for the next three years was in Havana, as a tutor to the sons of a wealthy Cuban. From 1801 to 1808 he was engaged in duties at Georgetown College and in missionary labors, and in the latter year was appointed bishop of Bardstown, Kentucky, in charge of the district between the Mississippi River and the Atlantic states and the Great Lakes to the 35th parallel. During his life he erected numerous colleges and convents, some of which were built at his own expense. He was the recognized American councilor of the pope, and was respected by all creeds and classes alike. He died in Nazareth, Kentucky, Feb. 11, 1850.

FLAGG, Edmund, an American author; born in Wiscasset, Maine, Nov. 24, 1815. After graduation from Bowdoin in 1835, he engaged in teaching in Louisville, Kentucky, and afterward studied law, and was admitted to practice in Missouri, at St. Louis, in 1837. He began his literary labors in contributions to the Louisville *Journal*. He was secretary of the Berlin legation in 1849 and consul at Venice in 1850–51. As head of the United States Bureau of Statistics in 1856–57, he published a series of valuable reports on cotton, tobacco and foreign commercial relations. He returned to journalism for a time, but retired from active public life in 1870. He wrote *The Far West* (1838); *Edmond Dantes*, a novel (1849); *Venice, the City of the Sea* (1853); *Mary Tudor*, a drama; and *De Molai: A Romance of History* (1888).

FLAGG, George Whiting, an American artist, a nephew of Washington Allston; born in New Haven, Connecticut, June 26, 1816. He studied in the United States, then spent several years in Europe, and subsequently settled in New York city. His productions comprise historical and genre pictures, and some portraits, all of which have been favorably received. His earlier work, which attracted much attention, includes *Murder of the Princes in the Tower* and *Boy Listening to a Ghost Story*. Of his later work, *Washington Receiving His Mother's Blessing* and *Columbus and the Egg* are the best known. Died in Nantucket island, Jan. 5, 1897.

FLAGG, Isaac, an American classical scholar

and educator, son of Wilson Flagg; born in Beverly, Massachusetts, Sept. 7, 1843. He graduated from Harvard in 1864, and received the degree of Ph.D. from Göttingen, Germany, in 1871. Upon his return to the United States he was tutor at Harvard (1865–69); professor of Greek at Cornell (1871–88); and became associate professor of philology in the University of California (1891). He has published *Versicles* (1883); *Euripides's Iphigenia among the Taurians* (1889); etc.

FLAGG, Wilson, an American naturalist, father of Isaac Flagg; born in Beverly, Massachusetts, Nov. 5, 1805; died in North Cambridge, Massachusetts, May 6, 1884. For a time he wrote for the Boston *Weekly Magazine* and the Boston *Post*, on political subjects, and then turned his attention to the agricultural journals, especially *Hovey's Magazine of Horticulture*. He also contributed at times to the *Atlantic Monthly*. From 1844 to 1848 he was employed in the Boston custom-house. In 1856 he settled in Cambridge, Massachusetts, and resided there until his death. He was the author of many valuable works on natural history, among which are *Studies in the Field and Forest* (1857); *Birds and Seasons of New England* (1875); and *A Year with the Birds* (1881).

FLAG-OFFICER. See Navy, Vol. XVII, pp. 291, 292.

FLAGSTAFF, a village and the capital of Coconino County, northern Arizona, just south of the San Francisco Mountains, in a region of superb scenery. It is reached by the Atchison, Topeka and Santa Fé and Central Arizona railroads. Mining, lumbering, farming, and stock-raising are its occupations. Population 1896, 1,100.

FLAGSTONE. See Geology, Vol. X, p. 237.

FLAMBOROUGH HEAD, a promontory of the Yorkshire (northeastern England) coast, forming the northern boundary of Bridlington Bay. It terminates a range of white perpendicular chalk cliffs, six miles long, containing fossil sponges, crinoids, etc. On the headland is a lighthouse 214 feet high.

FLAMBOYANT. See Architecture, Vol. II, pp. 431, 464.

FLAME, Luminosity of. From careful experiments conducted by Heuman, that eminent scientist advanced the theory, in 1878, that the luminosity of hydrocarbon flames is due to the presence of solid particles of incandescent carbon. The grounds on which his opinion is based may be briefly stated as: (*a*) The increased luminosity which chlorine gives to weakly luminous or non-luminous flames is due to its well-known property of separating the carbon as such. (*b*) A rod held in a flame is smoked only on the lower side, the side opposed to the gas stream. (*c*) A body held in a flame is smoked even when it is in a state of ignition. (*d*) These particles can be actually seen in the flame when it is made to strike against a second flame or an ignited surface, the particles aggregating so as to form visible masses. (*e*) The luminous portion of a flame is not very transparent—no more so than the layer of smoke of the same thickness which rises above a flame fed with turpentine. (*f*) Flames which unquestionably owe their luminosity to the presence of solid particles give a shadow with sunlight, precisely as do hydrocarbon flames, while luminous flames composed of ignited gases and vapors give no such shadow in sunlight.

FLAMES, Temperature of. By some very skillful experiments made by Rosetti in 1878, with his ingenious calorimeter, investigating the temperature of different flames, he is enabled to present to the scientific world the result of his investigations in the following table:

Locatelli lamp	920° C.
Stearine-candle	940° C.
Petroleum-lamp with chimney	1,030° C.
Petroleum-lamp without chimney—	
Illuminating part	920° C.
Sooty envelope	780° C.
Alcohol-lamp	1,170° to 1,180° C.
Bunsen burner	1,360° C.

Temperature of Electric Arc. The temperature of the electric arc has been determined by Violle, and is in the neighborhood of 3.500° C.

FLAMINIAN WAY (Via Flaminia), the great northern road of ancient Italy, leading from Rome to Ariminum (Rimini), on the Adriatic. It was constructed by C. Flaminius during his censorship (220 B.C.), in order to secure a free communication with the recently conquered Gaulish territory. When Augustus (27 B.C.) appointed persons of consular dignity surveyors of roads for the other highways of his dominions, he reserved the care of the Flaminian Way for himself, and renewed it throughout its whole length. See Rome, Vol. XX, p. 811; Flaminius, Vol. IX, p. 289.

FLAMMARION, Camille, a French astronomer; born at Montigny-le-Roi, Feb. 25, 1842; entered the Paris Observatory in 1858, and became a popular lecturer on astronomy. Retiring in 1865, he devoted himself to the popularization of science in periodicals and books. His principal publications are *The Plurality of Inhabited Worlds* (1862; 30th ed. 1884); *Imaginary Worlds and Real Worlds* (1864; 19th ed. 1884); *God in Nature* (1866; 18th ed. 1882); *Celestial Marvels* (1865); *Studies and Lectures on Astronomy* (9 vols., 1866–81); *History of the Heavens* (1872); *The Atmosphere* (1872); *The Stars and the Curiosities of the Heavens* (1881); *The Marvels of the Heavens* (8th ed. 1882); *Popular Astronomy* (1880); *Urania* (1889) and *Earth and Sky* (1893). Flammarion made many balloon ascensions for the study of aërial phenomena, and published a work, entitled *Travels in the Air*. In 1892 Flammarion

CAMILLE FLAMMARION.

took a deep interest in the observations of the planet Mars, and was among those who held the sensational, as well as insensate, theory that communication between the earth and our nearest celestial neighbors is not impossible.

FLANDERS, Henry, an American lawyer; born in 1826. He studied law with his father, Charles Flanders, and in 1850 settled in Philadelphia. He was the author of *Treatise on Maritime Law* (1852); *Law of Shipping* (1853); *Constitution of the United States: An Exposition* (1860); and *Principles of Insurance* (1871).

FLATHEAD INDIANS, a tribe of North American Indians, sometimes fictitiously called Salish. This tribe was confused by early explorers with the Oregon tribes who compressed the heads of their children and deserved the title *Flatheads*, but this tribe, although the name remains with them, and is applied to them almost entirely, never treated their children in such a manner. They live around Flathead Lake, in Montana, and along the valley of the Flathead River. They numbered in 1895 about five hundred.

FLATHEAD RIVER. See Montana, Vol. XVI, p. 772.

FLATTERY, Cape, a promontory on the east coast of Australia, in lat. 14° 52′ S., long. 154° 20′ E. It is about thirty miles to the north of Endeavor Bay.

FLATWORMS. See Tapeworms, Vol. XXIII, pp. 49–56.

FLAUBERT, Gustave, a French novelist; born at Rouen, France, Dec. 12, 1821; died in Paris, May 9, 1880. He belonged to the realistic school of novelists, was a pupil of Balzac, and is well known in America by his *Madame Bovary* (1857); and *Salammbô* (1862), which have been translated and extensively circulated. The first of these deals with Parisian life, and created a sensation and aroused opposition on account of its moral teaching. The other attracted attention by its archæological statements, many of which were in opposition to the beliefs of the time.

FLAX. See Vol. IX, pp. 293–298; and Agriculture, in these Supplements.

FLAX, New Zealand, the *Phormium tenax* of New Zealand, a plant of the lily family, cultivated for the strong fiber obtained from its large leaves. It is a tall plant, with very firm tufted linear leaves, keeled beneath and flat above. Having been introduced into the United States for ornament, it has become nearly hardy, but does not flower.

FLEABANE, the common name of various species of the family *Compositæ*, notably species of *Erigeron* in the United States and species of *Inula* in Europe. The latter is the original "fleabane," has yellow flowers, the whole plant emitting a peculiar aromatic smell, sometimes compared to that of soap, which is said to be efficacious in driving away fleas.

FLEAWORT, the *Plantago Psyllium*, a kind of plantain of Europe and Barbary. The seeds are mucilaginous, and are sometimes used for the same purposes as flaxseed.

FLEET PRISON or THE FLEET, for centuries a notorious London jail, stood on the east side of Farringdon Street, on the banks of the Fleet stream, formerly a rapid affluent of the Thames, and now embraced within the system of the sewerage of the city. It was king's prison and also debtors' prison from before the commencement of the thirteenth century. Here the religious martyrs of the reigns of Mary and Elizabeth were confined, and later the victims of the Star Chamber. The building was several times renewed. It was destroyed in the great fire of 1666, again burnt by the Gordon rioters in 1780, and was finally deemed a public nuisance. It was the scene of much irregularity and brutality, arising mainly from the extortions of the keepers, and of the Fleet marriages, which were contracted chiefly from the middle of the seventeenth to the middle of the eighteenth century. Prior to the passing of the Marriage Act of 1754, all that was required to render a marriage valid in England was the verbal and expressed consent of the parties; and as the Fleet at the time contained a number of dissolute ex-parsons, who were ready to celebrate a secret marriage for half a crown, or, according to Pennant, "for a dram of gin or a pipe of tobacco," persons wishing to marry, yet to keep their marriage secret, flocked to the Fleet. The Marriage Act of the 27th of March, 1754, put an end to the trade of the Fleet parsons; yet, as a sign of the popularity of the Fleet marriage, it is said that over two hundred marriages were entered in one register on the day before the act came into force. It became the great debtors' prison, and was the scene of many horrors. The prison was abolished in 1842. The buildings were demolished in 1845–46, and part of the site is now occupied by the Congregational Memorial Hall. The prison has had its history well told, with quaint illustrations, in John Ashton's entertaining book, *The Fleet: Its River, Prison and Marriages* (1888)

FLEGEL, Eduard Robert, a German African explorer; born in Wilna, Russia, Oct. 13, 1855. He devoted his life to the exploration of the Niger and Benue Rivers and the Cameroon country in general. In addition to the scientific side of his labors, he constantly had in mind the acquisition of territory for Germany. He ascended the Niger in 1879, and again in 1880, by a hitherto untraversed tributary. In 1883 he discovered the source of the Benue, which is navigable for steam-vessels from the sea to the central portions of Africa. He died Sept. 11, 1886, while on an expedition across the country between the Benue and the Congo.

FLEISCHER, Heinrich Leberecht, a German Orientalist; born at Schandau, Saxony, Feb. 21, 1801. After several years of study at Leipsic he catalogued the Oriental manuscripts of Dresden Library, and from 1831 to 1836 taught in the Kreuzschule at Dresden. In 1836 he was appointed professor of Oriental languages at Leipsic. He published an edition of Abulfeda's *Historia Moslemica* (1834); *Ali's Hundred Sayings* (1837); *Baidhavi's Commentary to the Koran* (1848); and a *Critical Dissertation on Habicht's*

Glosses to the First Four Volumes of the Thousand and One Nights (1836). He died in Leipsic, Feb. 10, 1888.

FLEMING, JOHN AMBROSE, a British electrical engineer; born in Lancaster, England, Nov. 20, 1849. He graduated from the University of London in 1870. After a short time spent in the chemical laboratories of the South Kensington Normal School, he entered St John's College, Cambridge, in 1877, graduating in 1880. He was elected to the chair of mathematics and physics in the University College, Nottingham, but resigned in 1881 to become electrical engineer for the London Edison Electric Lighting Company. He was instrumental in the organization of electrical engineering departments of various colleges, and of the London Board of Trade electrical laboratory. He published *Molecular Shadows in Incandescent Lamps; Problems of Electric Flow in Networks of Thin Conductors;* and other treatises. His main work, however, is *Alternate Current Transformer* (1889).

FLEMING, SANDFORD, a Canadian civil engineer; born in Kirkcaldy, Fifeshire, Scotland, Jan. 7, 1827. After a residence of seven years in Canada, he was employed (1852) in the engineering department of the Northern Railroad Company. He was active in the promotion of the building of a railway to connect Nova Scotia and the Pacific coast of Canada. The Intercolonial railroad was the first section to be constructed. It was finished in 1876. While superintending the construction of this, Fleming began the survey to the Pacific, a task not finished until 1877. He was elected chancellor of Queen's University, Kingston, in 1880, and was re-elected three times. He was the Canadian representative at the International Geographical Congress at Venice in 1881, and at the International Prime Meridian Conference at Washington in 1884. In addition to many contributions to various engineering and geographical journals, he published *England and Canada* (1884).

FLEMINGSBURG, a town and capital of Fleming County, northeastern Kentucky, on the Covington, Flemingsburg and Ashland railroad. It is the seat of a college. It has considerable trade in wheat, corn and tobacco, and has large distilleries. Population 1890, 1,172.

FLEMINGTON, a town and the capital of Hunterdon County, northwestern New Jersey, situated in a rich peach-growing district, 50 miles S.W. of New York City, on the Pennsylvania, the Lehigh Valley and the Jersey Central railroads. It has two potteries and a steam flour-mill. Population 1895, 2,060.

FLEMINGTON, a village of Taylor County, in the northeastern part of West Virginia, the seat of West Virginia College (Free-will Baptist).

FLEMISH LANGUAGE AND LITERATURE. See HOLLAND, Vol. XII, pp. 84–98.

FLEMMING, WALTHER, a German physiologist and anatomist; born April 1, 1843, in Sachsenberg, Germany. After a number of years spent in study at Berlin, Göttingen, Tübingen and Rostock, he was appointed to an instructorship at Amsterdam. From 1871 to 1876 he was successively tutor in anatomy at Rostock and Prague. In 1876 he was elected to the chair of histology and human anatomy at Kiel. He published a number of works in his special study; among them are *Cell-Substance, Marrow, and Cell-Partition* (1882); *Cells and Their Life-History* (1881); and *Regeneration of Tissue* (1885).

FLESH–FLY (*Musca vomitoria*), an insect of the same genus as the house-fly, which it much exceeds in size. The forehead is rust-colored, the thorax grayish, the abdomen blue, with three black bands; the expanse of wings nearly one inch. It deposits its eggs on flesh; and notwithstanding preventives, the maggots are of very frequent occurrence on meat in summer. There are several allied species. See *Brachycera*, under INSECTS, Vol. XIII, p. 150.

FLETCHER, JOHN, dramatist. See BEAUMONT AND FLETCHER, Vol. III, pp. 469–474.

FLETCHER, JOHN WILLIAM, originally DE LA FLÉCHIÈRE, an Anglo-Swiss theologian; born at Nyon, Switzerland, Sept. 12, 1729; died at Madeley, England, Aug. 14, 1785. He was educated at the University of Geneva, and at the age of 23 went to London to perfect his knowledge of the English language. He was ordained a minister of the Established Church in 1757, and became an able coadjutor of the Wesleys. In 1760 he settled as vicar of Madeley, and in 1771 the Countess of Huntingdon appointed him president of her theological school at Trevecca, Wales. The latter position Mr. Fletcher resigned upon being required to disavow Wesley's views, and published his well-known *Checks to Antinomianism.* After three years spent in Switzerland in pursuit of health, he returned to England and devoted himself to his work until his death. He was one of the founders of Methodism, and a man of great industry and piety. His writings are published in four volumes.

FLETCHER, ROBERT, an American surgeon and anthropologist; born in Bristol, England, March 6, 1823. He was educated in England and studied medicine at the London Hospital and at Bristol Medical College. He emigrated to the United States, and was a surgeon in the Union army during the Civil War. He was prominent in various philosophical and anthropological societies, and was for a time lecturer on medical jurisprudence at Columbian University. He wrote a number of valuable works; among which are *Prehistoric Trephining* (1882); *Human Proportion in Art and Anthropometry* (1883); *Tatooing among Civilized People* (1883); and *The New School of Criminal Anthropology* (1891).

FLEURUS, a small town of south Belgium, in the eastern part of the province of Hainault, situated north of the left bank of the Sambre, and 15 miles W. of Namur. It has been the scene of several contests. Population, 2,300.

FLEURY, ÉMILE FELIX, a French soldier; born in Paris, Dec. 23, 1815. He was educated at the Collége Rollin, entered the army in 1837,

served in eleven campaigns in Algeria, and by his gallantry obtained rapid promotion. He was made a general of division in 1863; served the Bonapartist cause; became an officer of the Legion of Honor in 1849; grand officer in 1859; and was summoned to the French Senate in 1865. In 1866 he was sent on a diplomatic mission to Italy, and in 1869 became ambassador at St. Petersburg. On the downfall of Napoleon III in 1870, he retired to Switzerland, and was placed on the retired list of the army in 1879. He died in Paris, Dec. 12, 1884.

FLEURY, Jules François Husson, a French author; born at Laon, Sept 10, 1821. In a number of early pieces for the theater, as well as later romances, he achieved some distinction as a realistic writer. Of his works in that line, those worthy of mention are *Contes d'Été* and *Contes d'Automne*. Works of greater value, however, were those on the history of caricature, of literature, and of art, from 1825 to 1840, and his *Bibliographie Céramique* (1882). He died at Sèvres Dec. 6, 1889.

FLEURY, Louis, Viscount de, a French soldier; born in Limoges, France, about 1740. He went to America as an independent volunteer, and offered his services to Washington at the beginning of the American Revolution. He was given a captain's commission. He served with Washington until the French forces under Rochambeau arrived, when he joined his countrymen. He showed such ability and bravery that he received a vote of thanks from Congress and a silver medal at the time of his return to France in 1780. He became an officer under Rochambeau in the revolution of 1793. He was taken prisoner and executed in Paris in 1794.

FLEXIBLE SANDSTONE or ITACOLUMITE. See *Diamond*, under Mineralogy, Vol. XVI, p. 381.

FLEXURE OF BEAM. See Elasticity, Vol. VII, pp. 808, 809.

FLIES. See Diptera, Vol. VII, pp. 255–257.

FLINDERSIA, a genus of Australian trees of the family *Meliaceæ*. It yields timber which is little inferior to mahogany.

FLINT, a city and the capital of Genesee County, southeastern Michigan, on the Flint River, and on the Chicago and Grand Trunk and Flint and Pere Marquette railroads. It is the seat of the state institution for the deaf and dumb, and of Oak Grove Home, a private institution for the feeble-minded. Its steam sawmills turn out annually 50,000,000 feet of lumber. Population 1894, 10,420.

DR. AUSTIN FLINT.

FLINT, Austin, an American physician; born Oct. 20, 1812, in Petersham, Massachusetts. His professional career began in 1833, upon his graduation from Harvard; he practiced in Boston, Massachusetts, and then in Buffalo, New York. In 1844–45 he was a professor at the Rush Medical College, in Chicago, Illinois, and from 1847, for six years, in the Buffalo Medical College. From 1852 to 1856 he was a professor in the Louisville University; in 1856, in the Buffalo Medical College; in 1858, in the New Orleans School of Medicine; in 1861, in the Long Island College Hospital; and from 1868 until his death was professor of the principles and practice of medicine in the Bellevue Hospital Medical College, New York. He was consulting-physician to various hospitals, and from 1872 to 1885 was president of the New York Academy of Medicine. He was a member of many medical and scientific bodies, both in America and Europe, and was present at several important medical congresses as a delegate. His contributions to medical literature were numerous. Among them are *Principles and Practice of Medicine* (1866); *Phthisis: Its Anatomy, Etc.* (1875); *Physical Exploration of the Lungs by Auscultation and Percussion* (1882); and *Medical Ethics and Etiquette* (1883). He died in New York City, March 13, 1886.

FLINT, Austin, an American physician, son of the preceding; born in Northampton, Massachusetts, March 28, 1836. He was graduated from the Jefferson Medical College, Philadelphia, in 1857; began to practice medicine in Buffalo, and in the following year became an attending surgeon in the Buffalo City Hospital, and a professor in the Medical College. In 1859 he was chosen professor of physiology in the New York Medical College, and in 1860 to a similar chair in the New Orleans School of Medicine. In 1861 he became professor of physiology and microscopic anatomy in the Bellevue Hospital Medical College, and for eight years lectured in the Long Island College Hospital. In 1874 he became surgeon-general of New York state. He wrote several works on physiological topics. His special studies of the nervous system and the glycogenic function of the liver have placed him among the foremost of contemporary physiologists. His work, *The Physiology of Man* (1874), is a standard work on that subject. Others of his works are *Text-book of Human Physiology* (1881) and *Source of Muscular Power* (1878).

FLINT, Robert, a Scotch theologian; born in Dumfries, Scotland, in 1838. He was educated at the University of Glasgow and was ordained to the East Church, Aberdeen, in 1859. He was appointed professor of moral philosophy at St. Andrews in 1864, and in 1876 professor of divinity at the University of Edinburgh. He published *Philosophy of History in France and Germany* (1874); *Theism* (1876); and *Anti-Theistic Theories* (1877).

FLINT GLASS. See Glass, Vol. X, pp. 657, 658.

FLINT IMPLEMENTS. See Archæology, Vol. II, pp. 338, 339.

FLINT RIVER rises in Clayton County, western Georgia, and flows, by an irregular course, to the southwest corner of the state, where it unites with the Chattahoochee to form the Appalachicola

River. It is about three hundred miles in length, and is navigable by light-draft steamers as far as Albany, nearly 150 miles from its mouth.

FLINT RIVER, in southeastern Michigan, rises in Lapeer County, flows west and northwest and unites with the Shiawassee to form the Saginaw River. It is about one hundred miles in length.

FLOATING ISLAND, the formations caused either by the aggregation of driftwood in the creeks and bays of tropical rivers and the deposition thereon of soil and vegetable matter, or by the detachment of portions of a river bank or lake shore, on which the interlacing roots of plants constitute a foundation sufficiently strong to support soil whereon herbage, and occasionally even trees, are able to grow. Floating islands are sometimes seen fifty or one hundred miles distant from the mouth of the large rivers of America, Asia and Africa.

FLODDEN FIELD. See SCOTLAND, Vol. XXI, p. 497.

FLOOD PLAINS. See GEOLOGY, Vol. X, p. 277.

FLOODS. See RIVER-ENGINEERING, Vol. XX, pp. 571 et seq.

FLOOR OR FLOORS. See BUILDING, Vol. IV, pp. 452, 455, 482, 493.

FLOQUET, CHARLES THOMAS, French statesman; born in St. Jean-de-Luz, France, Oct. 5, 1828, and called to the Parisian bar in 1851. After the fall of the empire he was deputy mayor and member of the National Assembly, but, having resigned during the Commune, he was suspected of disloyalty and interned at Pau until 1872. He subsequently held various offices; was vice-president of the Chamber in 1881; prefect of the Seine in 1882; and was president of the Chamber in the Brisson Cabinet. He formed a ministry on the resignation of the Tirard Cabinet in 1888, and was president of the Council and minister of the Interior. He wounded General Boulanger in a duel fought in 1888. Having introduced a bill for the revision of the French Senate, the ensuing debate resulted in the defeat of his Ministry, and he resigned in 1889. He was elected president of the Chamber Nov. 16, 1889, but in 1892 resigned under charges connected with the Panama scandal, from which he was afterward exonerated. Died in Paris, Jan. 18, 1896.

FLORÉAL (the "flowery"), the eighth month of the year in the calendar of the first French republic, which, from Nov. 24, 1793, to Sept. 9, 1805, was used in place of the Gregorian. It commenced April 20th and ended May 20th.

FLORENCE, COUNCIL OF. See POPEDOM, Vol. XIX, p. 503.

FLORENCE, a city and the capital of Lauderdale County, northwestern Alabama, situated at the head of navigation on the Tennessee River, and on the Louisville and Nashville railroad. Here is a state normal school, the Southern University for women, an academy and Synodical Female College. There are in the vicinity several cotton factories. Population 1890, 6,012.

FLORENCE, a village and the capital of Pinal County, southeastern Arizona, on the Gila River, 50 miles S.E. of Phœnix. It has a United States land-office, a smelting-furnace for silver, and an agricultural trade. Population 1890, 6,012.

FLORENCE, a city of Marion County, eastern central Kansas, situated at the confluence of the Cottonwood River and Doyle Creek, on the Atchison, Topeka and Santa Fé railroad. The industries are farming and quarrying building-stone. Population 1895, 1,474.

FLORENCE, a town and the capital of Florence County, eastern South Carolina, 87 miles W. of Columbia, on the Atlantic Coast Line railroad. Its industries are railway-car repairing, milling and cotton-trading. Population 1890, 3,395.

FLORENCE, the capital of Florence County, northeastern Wisconsin, located in the vicinity of iron-ore mines, on the Chicago and North-Western railroad. The lumber trade and iron business are the sources of business in the town. Population 1890, 444; 1895, 1,551.

FLORENCE, WILLIAM JAMES, actor. See CONLIN, BERNARD, in these Supplements.

FLORES ISLE. See AZORES, Vol. III, p. 172.

FLORES, JUAN JOSÉ, an Ecuadorian general; born in Puerto Cabello, Venezuela, July 19, 1800. He was pressed into the Spanish service in 1815, but escaped to New Granada and fought with that state in 1819, and subsequent campaigns under Bolivar. He was appointed brigadier-general in 1826, and in 1828 commander-in-chief of the Ecuadorian army. When Ecuador became independent in 1830, he was elected to the Presidency. He remained at the head of the government until 1845. He died at sea in 1864.

FLORES, VENANCIO, a Uruguayan revolutionist; born in Paysandu, in 1809. He was the leader of an insurrection in 1853, which was for a time successful, but which was put down in 1855. During that time he had placed himself in the Presidency of the republic. He headed the revolutionary forces in 1858, and again in 1863. He took a prominent part in the conquest of Paraguay in 1865. He was elected President of Uruguay in 1866, by the help of Brazil, but was forced to resign by his own sons in 1868. He was assassinated Feb. 19, 1868.

FLORESVILLE, a village and the capital of Wilson County, central southern Texas, on the San Antonio and Aransas Pass railroad, and on the Ansonio River, 45 miles S.S.W. of Austin. Cotton and live-stock are its leading products. Population, 1,100.

FLORICULTURE. While floriculture has been carried on as a business in the United States for more than one hundred years, its extent was not of large proportions until during the last score of years. It was not made a subject of official census investigation until 1890. The government report, April 21, 1891, shows the recent growth of the business to have been very remarkable.

Floral establishments were found in every state except Idaho, Nevada, Indian Territory and Okla-

homa. In the United States there were 4,659 floral establishments, 312 of which were owned and conducted by women. Of the total number of establishments, 2,795 were started between 1870 and 1890, and of these 1,797 between 1880 and 1890. These 4,659 establishments had in use, in the census year, 38,823,247 square feet of glass, covering a space of more than 891 acres of ground. The establishments, including fixtures and heating apparatus, were valued at $38,355,722.43; tools and implements, $1,587,693.93, and gave employment to 16,847 men and 1,958 women, who earned in the year, $8,483,657. Fuel for heating cost $1,160,152.66. The products for the year were 49,056,253 rose-bushes, 38,380,872 hardy plants and shrubs, while all other plants amounted to 152,835,292, reaching a total value of $12,036,477.76 for plants. Cut flowers brought an additional income of $14,175,328.01.

From the census report, it appears that the largest number of square feet of glass in one establishment in the United States is in the District of Columbia; the oldest establishment was started in New York; the largest number of roses propagated were, respectively, in Pennsylvania, Illinois and Ohio; the largest number of hardy plants propagated were, respectively, in Illinois, New York and Kansas; the largest total value of plant sales were, respectively, in New York, Pennsylvania and California, and the largest total value of cut-flower sales were, respectively, in New York, Illinois and Pennsylvania. In the number of establishments, New York heads the list with 793, and Pennsylvania second with 544. The New York greenhouses were valued at $10,000,000; those of Pennsylvania, about $6,000,000.

In addition to the Society of American Florists, 965 state and local floral societies and clubs and 358 horticultural societies, aided by the agricultural and horticultural press, helped to develop this industry to its present large proportions.

New Jersey, situated, as it is, between the New York and Philadelphia city markets, makes the largest showing of any state in the Union in proportion to its size.

FLORIDA. For a general account, and history prior to 1880, see Vol. IX, pp. 338, 339. Florida has an area of 58,680 square miles, making it the largest state east of the Mississippi River. It is

STATE SEAL OF FLORIDA.

divided into 45 counties. The population in 1880 was 269,493, which had increased in 1890 to 391,422, and in 1895 to 464,639, of whom 271,561 were white, 193,039 colored and 39 Indians. It has a coast-line of 472 miles on the Atlantic and 674 on the Gulf. Owing to numerous keys, coral reefs and shallow soundings, there are but few good harbors, the best being St. Augustine and Fernandina on the Atlantic, and Pensacola, Appalachicola, St. Marks, Cedar Keys, Tampa, Charlotte and Key West on the Gulf, and Jacksonville on St. Johns River. The greatest elevation is not more than 250 feet above the sea-level.

The total assessed valuation of all property in 1894 was given at $104,144,605, the rate of assessment being about 35 per cent of actual value. For the same year the farm animals and their values were given as follows: Horses 33,144, value $2,200,674; mules 8,365, value $724,721; milch cows 114,332, value $1,564,062; oxen and other cattle 375,981, value $3,111,393; sheep 112,885, value $202,335; hogs 388,074, value $924,548; total head 1,032,784; total value $8,727,733. The principal crops of 1894 were corn, 516,242 acres, producing 5,214,044 bushels, valued at $3,701,971; oats, 54,570 acres, yielding 643,926 bushels, valued at $329,795; potatoes, 1,422 acres, producing 127,980 bushels, of the value of $95,985; hay, 6,719 acres, producing 8,264 tons, valued at $134,290. Total value of the above, $4,325,041. The cotton crop of 1894 was 45,637 bales, which was increased in 1895 to 60,000 bales. The growing of sugar-cane is becoming an extensive industry. Cane is grown and syrup made in every county, and sugar made in 28 of the 45 counties. One factory recently erected has a capacity of 100,000 pounds of dry sugar per day. The value of the annual product is constantly increasing, and aggregated in 1895 more than $1,000,000. The growing and preparing of Spanish moss for the trade is becoming an important industry, yielding an annual revenue of about $500,000. The manufacture of turpentine is assuming large proportions, a syndicate having purchased 12,000 acres of heavily timbered land, erected numerous stills and built a railroad to give an outlet to the market.

The equable climate of Florida, together with the natural adaptation of the soil, makes fruit-growing profitable. The fruit-production of the state for 1894, together with the values, is as follows: Oranges, $4,380,621; pine-apples, $470,571; strawberries, $104,814; lemons, $81,635; peaches, $122,035; pears, $80,145; grape-fruit, $27,170; bananas, $21,350; and in addition to these, large amounts of sugar-apples, cocoanuts, limes, pecans, mangoes, avocado pears and guavas were raised, amounting in value to more than $30,000. A destructive frost visited the state on Dec. 29, 1894, doing almost inestimable damage. All oranges on the trees, estimated at one half the crop, were frozen in all portions of the state, except Key West. Hundreds of thousands of pine-apples were totally destroyed. Most of the young orange trees were killed, as were the lemon trees, grape-fruit, bananas, guavas, mangoes and other tropical fruits. Strawberries and other small fruits were ruined, as were tomatoes, egg-plants and other vegetables.

In 1894 Florida had 805 manufacturing estab-

lishments, with a total capital of $11,110,304; 13,927 persons were employed, to whom $6,513,068 were paid as wages; the value of the products was $18,222,890. In the fiscal year ending June 30, 1894, the collections of internal revenue in the two districts of Florida aggregated $416,332.82, from the following sources: Distilled spirits, $12,335.95; tobacco, $396,553.46; fermented liquors, $1,009.58; oleomargarine, $5,464; and penalties, $969.83. In 1895 the same sources yielded $470,763.03.

For 1895 the manufacturing and miscellaneous industries showed a total output of $10,382,197, of which the principal were saw, planing and shingle mills, $5,872,708; mining, $1,965,000; followed by ice factories, fertilizer-works, foundries,

THE CAPITOL, TALLAHASSEE.

brickyards and fisheries. The total output of phosphates for 1894 was estimated at 500,000 tons. About 15 miles south of Tallahassee hard limestone-rock, building-granite and a fine grade of white, black and red marble have been found in abundance, adjacent to the railroad, and large quantities have already been quarried and shipped.

The existence of considerable deposits of phosphates had been known long prior to 1888, but it was not until that year that their extent and richness was at all understood. The report of the state geologist, Dr. Kost, awakened wide interest among capitalists both at home and in other states, and created an excitement similar to that in the oil regions of Pennsylvania at the time of the discovery of petroleum there. Some of the beds developed are thirty feet in thickness, and it is stated that the phosphate can be mined and placed in the car for shipment for fifty cents per ton. The first mining of any extent was done in the counties bordering on the Gulf, but as the interest in the industry increased, additional discoveries were made, and there is scarcely a county in the state in which phosphate has not been found. The Florida article is very rich in bone phosphate of lime, some samples showing, on analysis, 68 per cent. During 1893 there were shipped from Fernandina alone over 10,000 tons in a single month, and from Tampa over 12,000 tons in the same time.

For the fiscal year ending June 30, 1894, the total imports of merchandise through the principal seaports of the state aggregated $1,310,493, and the exports for the same period, $8,289,036. October 31, 1894, there were 19 national banks in operation, whose combined capital was $1,485,000; deposits, $4,430,000. There were also 18 state banks, with an aggregate capital of $435,500, deposits of $781,638, and total resources of $1,830,000. There are, also, two savings banks; the combined capital $170,000, deposits $175,000, and resources $420,297.

There are 2,926 miles of railroads within the state, the total investment aggregating nearly $80,000,000. For 1895 the gross earnings were $4,000,000, the net earnings $1,000,000.

At the beginning of 1895 there were 1,083 post-offices in the state, of which 25 were Presidential and 1,058 fourth-class. At the same time the total state debt was $1,232,500. The number of newspapers printed in the state was 153, there being papers published in 42 out of the 45 counties. Of these papers 19 were daily, 3 semi-weekly, 117 weekly, 1 fortnightly and 13 monthly.

At the close of 1894 the number of pupils enrolled in the public schools of the state were 96,775; average daily attendance, 64,138; male teachers, 294; female teachers, 1,629; expenditures, $647,175. Of the total enrollment 59,503 were white pupils and 37,272 were colored, and 772 colored teachers were employed.

The Methodist Episcopal Church South has about 25,000 members in the state; the African Methodist Episcopal, about 23,000; the colored Baptists number about 20,000; white Baptists, about 18,000; Roman Catholics, about 16,000; African Methodist Episcopal Zion, about 14,000; with memberships in the Methodist Episcopal, Protestant Episcopal, Presbyterian, Disciples, Congregational and other denominations aggregating about 20,000.

There is a state agricultural college at Lake City; De Land College at De Land; East Florida Seminary at Gainesville; West Florida Seminary at Tallahassee; Rollins College at Winter Park; state normal college for whites at De Funiak Springs; state normal college for colored teachers at Tallahassee; state insane asylum at Chattahoochee; and a state academy for the blind, deaf and dumb at St. Augustine.

The principal cities of the state are Key West, 18,080; Jacksonville, 17,201; Pensacola, 11,750; St. Augustine, 4,742; Tallahassee, the capital, 2,934; Tampa, 5,000; and Gainesville, 2,790.

In 1886 Florida adopted a new constitution, which went into effect Jan. 1, 1887. Under it the executive department consists of a governor, attorney-general, comptroller, treasurer, superintendent of public instruction and commissioner of agriculture, each of whose term of office is four years. The governor is ineligible to re-election for the next succeeding term. The governor has the appointment of an adjutant-general, with the rank of major-general, who is chief of the governor's staff. The legislative department consists of a senate and house of representatives, the former having 68 and the latter 32 members. Sen-

ators are elected for four years, and representatives for two years. The legislature meets biennially, and each session is limited to 60 days. The judicial department consists of a supreme court, with three supreme judges, each holding office six years, and elected by the people, one every two years; circuit courts, with seven circuit judges, one for each judicial circuit, appointed by the governor and confirmed by the senate, the term of office being six years; county courts, one county judge being elected in each county, and holding office four years; and justices' courts, two or more justices of the peace being elected in each county for a term of four years.

The following is a list of the governors of Florida since the admission of the state into the Union in 1845: William D. Moseley, 1845–49; Thomas Brown, 1849–53; James E. Broome, 1853–57; Madison S. Perry, 1857–61; John Milton, 1861–65; William Marvin, 1865–66; David S. Walker, 1866–68; Harrison Reed, 1868–72; Ossian B. Hart, 1872–74; M. L. Stearns, 1874–77; George F. Drew, 1877–81; William D. Bloxham, 1881–85; Edward A. Perry, 1885–89; F. P. Fleming, 1889–93; H. L. Mitchell, 1893–97; W. D. Bloxham, 1897.

FLORIDA, Cape, the southern point of Biscayne Key, Dade County, southern Florida, at the entrance of Biscayne Bay. On it is a lighthouse with a fixed white light, at lat. 25° 39′ 56″ N., long. 80° 9′ 24″ W.

FLORIDEÆ. See Vegetable Kingdom, Vol. XXIV, p. 127.

FLORIDIA, a town of Sicily, in the province of Noto, 7 miles W.N.W. from Syracuse. It stands in a wide plain, surrounded by vineyards, olive groves and corn-fields. Population, 8,492.

FLORIN (It., *fiorino;* from the Latin *flos*, a flower), a silver coin so-called either in allusion to Florence, where it was first struck in the twelfth century, or because it was stamped with a lily. The florin was issued in gold at Florence in 1252. The name was subsequently given to different coins in different countries. England struck a gold florin in 1343, and the silver coin, worth two shillings, or about 48 cents in United States money, current since 1849, bears the official name of florin; the gold and silver florin of the Netherlands is worth about 40 cents and is the monetary unit, and the silver florin of Austria about 48.6 cents, formerly the unit.

FLORIO, Caryl, an English-American organist and composer; born Nov. 3, 1843, in Tavistock, England. When he was fifteen years of age he moved with his parents to New York City. He studied under prominent organists there, and attained such proficiency that he was appointed organist of Zion Church, and later of the Presbyterian "Brick" Church. He published an edition of *Children's Hymns, with Tunes*, and composed a number of anthems, hymn tunes, two operas and several cantatas.

FLOSS SILK. See Silk, Vol, XXII, p. 60–63.

FLOTOW, Friedrich, Freiherr von, a German composer; born at Teutendorf, in Mecklenburg, April 27, 1812; died at Wiesbaden, Jan. 24, 1883. At the age of fifteen he went to Paris and began to study under Reicha. His reputation was made by his earliest operas, *Le Naufrage de la Méduse* (1839); *Stradella* (1844); and *Martha* (1847). In 1856 he was appointed intendant of the theater at Schwerin. In 1863 he resigned this position and returned to Paris, but in 1868 removed to Vienna. Of his later operas three attained marked success: *Indra* (1853); *La Veuve Grapin* (1859); and *L'Ombre* (1870).

FLOUR. Prior to 1870 flat or low grinding was universally prevalent in the mills of the United States. The agencies employed were substantially identical with those found in English mills. In Europe the system known as "American" simply referred to the automatic character of American mills, without reference to results produced or processes employed. Oliver Evans (born 1755, died 1819) was the first to introduce automatic milling by his invention of the conveyor and elevator. These made all the operations of the mill continuous and automatic from the receiving of the wheat to the packing of the flour. This is still characteristic of American mills, and has been generally, though not universally, adopted in European countries.

Soon after 1870 the so-called "new process" came into extensive use, and was universally adopted in the larger American mills. In flat grinding the aim had been to make the largest possible production of flour by once grinding the wheat. The residue—bran, middlings and shorts—was either sold as feed, or if the middlings were ground again, the result of the second grinding was a flour of low grade. The introduction of the middlings purifier, which was a French idea, modified and improved by American inventors, enabled millers, by cleansing the middlings of impurities in the form of particles of bran, to make the flour of this second grinding much superior to that obtained by the first grinding of the wheat. This flour was called "patent," by a misnomer, which has, nevertheless, adhered to it. The flour made by the first grinding was known as "bakers'" or "clear" flour, and the residue as low grade.

The fact that middlings flour was superior to any that could possibly be obtained by flat or low grinding soon led millers to grind so as to produce as many middlings and as little flour as possible on the first grinding. This style of grinding, called "high grinding," soon produced a further revolution in American milling through the introduction of chilled-iron rolls. These rolls, used in Hungary since 1844, permitted a much more gradual reduction of the wheat to middlings and flour than millstones, and with their advent came a new name for the American sty e of milling,—"gradual reduction." Other a vantages over millstones were claimed for rolls, and after 1878 their adoption became very general in the larger mills. However, the mechanical features of the roller-mill were improved by American manufacturers, principally in the substitution of the belt-drive for the cumbrous gears of the European machines. American milling is not so

elaborate as the Hungarian system, but follows its general plan of making many reductions and separations. Spring wheat, being harder than most winter wheats, was at first supposed to be better adapted for roller-milling; but the roller system has been quite generally adopted by all the larger mills, without reference to the character of the wheat. Other machines besides the roller-mill have also been introduced in the United States, based on European models. These refer especially to bolting or dressing the flour, and are various forms of centrifugal reels and flat-surface bolters.

The flour-mills of the United States number over eighteen thousand. Minneapolis is the largest milling center, while Pennsylvania has the largest number of mills (nearly three thousand), but most of them are small. The entire milling capacity of the United States is largely in excess of the requirements, and if continuously operated, could, in three months, grind all the wheat produced in the United States in any one crop. The home market requires about seventy-five million barrels of flour per annum, while of late years the annual exports from the United States have reached about sixteen million barrels. The millers of the United States have a national association, several state organizations and a number of mutual fire insurance companies. See FLOUR, Vol. IX, pp. 343–347.

FLOWER. See BOTANY, Vol. IV, pp. 126–148; HORTICULTURE, Vol. XII, pp. 247–268.

FLOWER, BENJAMIN ORANGE, an American journalist; born Oct. 19, 1858, in southern Illinois. He received his collegiate education at Kentucky University, Lexington. His first journalistic ventures were at Albion, Illinois, where he founded the *American Sentinel*. In 1880 he moved to Boston, and in 1889 founded the *Arena*, a magazine which has become popular for its sociological discussions. He has published, of his own writings, a number of works bearing upon the social problems of the day. The first of these was published in 1893, *Civilization's Inferno: Studies in the Social Cellar*. The last one (1896), and thus far the most pretentious of his writings is *The Century of Sir Thomas More*.

ROSWELL P. FLOWER.

FLOWER, ROSWELL PETTIBONE, an American public man; born at Theresa, New York, Aug. 7, 1835. He worked as a farm-hand, as a brickmaker, and as a clerk in the village store; and, having taken a course in the high school of Theresa, became a teacher. Removing to Watertown, New York, he combined a jewelry with a brokerage business; engaged in banking in New York City in 1869; and commenced to interest himself in politics. In 1881, upon the resignation by Levi P. Morton of his seat in Congress when appointed minister to France, Mr. Flower was elected, as a Democrat, to fill the vacancy. The following year he was elected for a full term. In the same year he was a candidate for the Democratic nomination for governor; and in 1885 declined the nomination for lieutenant-governor. In 1888 and in 1890 he was again elected to Congress. In 1891 he was elected governor of the state. During the cholera scare of 1892 he took a prominent part. On Sept. 10, 1892, the passengers of the *Normannia* were transferred, first to the *Stonington* and afterward to the *Cepheus* to be taken to Fire Island, where Governor Flower had secured the hotel for quarantine purposes, personally guaranteeing $50,000 of the $210,000 paid for the purchase. The *Cepheus* was unable to land, and had to put out to sea, the passengers suffering untold hardships. The people of Fire Island rose against the landing of the passengers, but Governor Flower was prepared for prompt measures, and on the 13th sent the militia to effect the landing, but there was no necessity for extreme measures. In 1886 he was appointed one of the electric subway commissioners of New York city, and in 1893 the University of Lawrence bestowed on him the degree of LL.D. In 1896 he ranged himself on the side of gold. Died in Eastport, Long Island, N. Y., May 12, 1899.

FLOWER, SIR WILLIAM HENRY, English zoölogist; born at Stratford-on-Avon, Nov. 30, 1831. He was educated at University College, London; served as assistant surgeon in the Crimea, and afterward became demonstrator of anatomy at the Middlesex Hospital. In 1861 he was appointed conservator of the Hunterian Museum; in 1869 Hunterian professor of comparative anatomy and physiology, and in 1884 director of the natural history department of the British Museum. He has written numerous scientific papers and several volumes, chiefly on mammals. Among his principal works are *Osteology of the Mammalia* (1885); *Diagrams of the Nerves of the Human Body* (1872); and *The Horse: A Study in Natural History* (1892). He contributed the articles on the HORSE, KANGAROO, SEAL, etc., in this ENCYCLOPÆDIA.

FLOWER-DE-LUCE OR FLEUR-DE-LIS. See IRIS, Vol. XIII, p. 276.

FLOYD, JOHN BUCHANAN, an American statesman and Confederate general; born in Blacksburg, Virginia, June 1, 1807; educated at the College of South Carolina, and practiced law in Arkansas and Virginia. He was in the Virginia legislature in 1847–49 and 1853, and was governor in 1850–53. He was Secretary of War from 1857 to 1860; resigned in the latter year and went over to the Confederacy. He was charged with using his official position to aid the rebellion by the improper disposition of government troops and arms, and also with being an accessary to the theft of $870,000 in bonds, but was exonerated by an investigating committee.

In 1861 he was appointed brigadier-general in the Confederate army; was defeated at Fort Donelson, Feb. 16, 1862, and relieved from command. He died near Abingdon, Virginia, Aug. 26, 1863.

FLOYD, WILLIAM, a signer of the Declaration of Independence; born in Brookhaven, Suffolk County, New York, Dec. 17, 1734. In 1774 he was a delegate to the Philadelphia Congress, and in 1775 was chosen a delegate to the first Continental Congress. He was a member of every Continental Congress up to 1782, and at the same time, from 1777 to 1783, was state senator. He held the same office from 1784 to 1788. In 1792, 1800 and in 1804 he was a Presidential elector, and in 1801 he sat for Suffolk County in the convention of that year. He died in Weston, Oneida County, New York, Aug. 4, 1821.

FLUKEWORMS OR FLUKES. See TREMATODA, Vol. XXIII, pp. 535–540.

FLUOR. See FLUOR-SPAR, Vol. IX, p. 349.

FLUORESCEIN. See PHTHALIC ACID, Vol. XVIII, p. 855.

FLUORESCENCE. Certain substances, like fluor spar and sulphate of quinine, have the power of absorbing light of short wave-length, and simultaneously emitting light of longer wave-length. Sulphate of quinine shines when exposed to rays of wave-lengths too short to affect the eye directly. This property is probably allied to the power which platinum-barium, cyanide and calcium tungstate have of becoming luminous when exposed to the X rays, which are themselves invisible. See LIGHT, Vol. XIV, pp. 602, 603; and MINERALOGY, Vol. XVI, p. 376.

FLUORESCENT LAMP, an electric lamp invented by Thomas A. Edison in 1896. It has a bulb of glass, resembling that of the ordinary incandescent electric light, except that it is more circular, and that the wires enter at a greater distance apart. There is no platinum film to become incandescent, the light being obtained by coating the inside of the glass bulb with tungstate, against which the lines of force of the currents from the wires are directed, so that the molecules of air strike the tungstate, rebounding in all directions, and causing fluorescence. It is not necessary to maintain as perfect a vacuum as with the incandescent lamp, and the whole globe glows with a white light that bears a strong resemblance in appearance to sunlight. The tungstate is attached to the glass by fusion. Other fluorescent metals besides tungstate may be used. No perceptible heat is developed by the light, which is in marked contrast to the incandescent lamp, which develops 95 per cent of heat and only 5 per cent of light. Professor Edison states that the fluorescent lamp of 2-candle power will light a room as well as a 16-candle power incandescent lamp, though the photometer shows only about twice as great illuminating effect for lamps of the same candle-power. It is also claimed that the new lamps will last much longer than the incandescent, since there is no filament to burn out.

C. H. COCHRANE.

FLUORINE. See CHEMISTRY, in these Supplements.

FLUOROSCOPE. An instrument devised by Thomas A. Edison for transforming the X rays into light, so that an observer may see the bones in his hand, or discern articles through several inches of wood, etc. It has been manufactured in two forms, one for private use and one for exhibition purposes. The former instrument is a light pasteboard box about a foot long, with a handle below. One end is made to fit the eye, and is strapped to the head, to secure good adjustment. The box tapers outwardly toward the farther end, which is rectangular, and contains the fluorescent screen. Inside, the box is painted black, except the screen, which is made of simple pasteboard, first covered with white paper, and then coated with collodion. Fine crystals of calcium tungstate are then sifted on the collodion, followed by a sifting of coarser crystals, until there is an even coating of the crystals all over the screen. When the fluoroscope so made is held toward the light of a Crookes tube at the proper distance, the observer is able to see right through the pasteboard screen, whose fluorescence changes the X rays, and thus the various phenomena discovered by Roentgen may be observed visually. A current of four amperes is passed through the Crookes tube to enable the bones of the hand to be seen to advantage. In searching for a suitable material for making this fluorescent screen Mr. Edison tried over eighteen hundred different salts, and found 72 that would fluoresce, calcium tungstate being the most satisfactory. The form of the fluoroscope used for exhibition purposes is larger, having a screen of about twenty inches square, and arranged so that observers may pass in a line and place their hands within the screen. Still another form is being arranged for use by physicians in hospitals.

C. H. COCHRANE.

FLUSHING, a city of New York, on the north shore of Long Island (see Vol. IX, p. 350). The city is largely populated by New York business men, and has all city improvements, such as good schools, churches, street-railways, gas and electric lights, free postal delivery, banks, building and loan associations, excellent water-works, police force, fire department and a handsome public park. Population 1880, 6,682; 1890, 19,136.

FLUSTRA, a genus of polyzoa, in which the colonies have the form of mat-like, branching structures, which greatly resemble some of the ribbon-like seaweeds. Microscopic examination shows that the broad, flat branches are thickly studded with numerous polypes. Each individual animal is contained in a cavity or cell. The colonies are commonly known as "sea-mats."

FLUX. See METALLURGY, Vol. XVI, p. 62.

FLY FUNGUS OR FLY-MOLD, a name given to species of the genus *Empusa*, which are parasitic on flies, grasshoppers, moths, etc. The best-known species is *E. muscæ*, which appears as an epidemic on the common house-fly toward

autumn, the dead flies becoming attached to windows and walls. The body is swollen by the growth of the white, thread-like hyphæ, which forms spores by the abstriction of special branches. These white, dust-like spores may be found in a circle about the dead bodies.

FLYING. See FLIGHT, Vol. IX, p. 310; and AËRONAUTICS, in these Supplements.

FLYING–DRAGON OR FLYING–LIZARD, a name given to East Indian saurians of the genus *Draco*. The animals possess a peculiar structure, formed by the skin spread out along the sides of the body, and supported by about five false ribs. This is ordinarily folded close to the sides of the body, but when expanded it is used as a parachute, enabling the animal to glide from tree to tree. These lizards are beautifully colored.

FLYING–LEMURS, two species of insectivorous mammals of the genus *Galæopithecus*. A peculiar membrane extends from fore limbs to hind limbs and tail, forming a sort of parachute, which enables the animal to glide from tree to tree. See MAMMALIA, Vol. XV, p. 401.

FLYING–MACHINES. See AERONAUTICS, *ante*, pp. 55–57.

FLYING–PHALANGER. See PHALANGER, Vol. XVIII, p. 729.

FLYING–SQUID, a name sometimes given to cephalopod mollusks of the genus *Ommastrephes*, because they often dash backward with such velocity that they shoot some distance above the surface of the water. They are abundant north of Cape Cod, and constitute the food-supply of many fishes, and are economically important because they furnish the principal bait used in the cod-fishery.

FLY–WHEEL. See MECHANICS, Vol. XV, pp. 769, 770.

FOCUS. See OPTICS, Vol. XVII, pp. 799, 800, 804, 805.

FŒTUS. See MAMMALIA, Vol. XV, p. 369.

FOG. See METEOROLOGY, Vol. XVI, p. 126, 127.

FOGO, a town and port of Fogo Island, about 15 miles off the northeast coast of Newfoundland. It has fisheries of importance, and considerable trade. Population, 800.—Fogo is also the name of one of the CAPE VERD ISLANDS; q.v., Vol. V, p. 52.

FOG–SIGNALS. To avoid collisions at sea and on large lakes, and to prevent vessels from running upon dangerous shores during heavy fogs which prevail at intervals near all large bodies of water, systematic signals of warning were found necessary. The most powerful lights proved inefficient, and navigators have long been obliged to resort to sound. Before the invention of steam, the ringing of bells and gongs and the firing of cannon were the only signals made use of; but the roar of the sea on the shore exceeded the noise of these instruments, and so only in rare cases did they give the necessary warnings. On board ship these signals were more effective, and are used upon fishing-smacks and sailing-vessels to-day. It was next attempted to make use of the horn, but to force a sufficiently powerful current of air through the horn to produce a strong blast was not practicable until the invention of the steam engine. The steam-whistle, more shrill than a blast-horn, is in constant use in the lighthouses of the sea-coasts and the majority of modern vessels. But this whistle, powerful as it is, is not strong enough in some instances, and use is made of the siren invented by Cagnard de la Tour for experiments in acoustics and harmonics. The steam-siren is the most effective of signals, and can be heard from twenty to thirty miles from land. For a description of the siren, see ACOUSTICS, Vol. I, p. 109. For vessels at sea a system of signals is maintained by all nations with but slight alterations. See NAVIGATION, Vol. XVII, p. 277.

FOHR. See SCHLESWIG-HOLSTEIN, Vol. XXI, p. 414.

FOKTCHANY OR FOKCHANI. See FOKSHAN, Vol. IX, p. 354.

FOLGER, CHARLES JAMES, an American jurist; born in Nantucket, Massachusetts, 1818. He was admitted to the bar of New York in 1839, and held various judicial offices in New York state. In 1856 he left the Democratic and joined the Republican party, and from 1861 to 1869 sat in the state senate. In 1869–70 he was assistant treasurer of the United States in New York; in 1871 was elected to the state court of appeals; served as chief justice in 1880, and was re-elected as associate for a full term the same year. In October, 1881, President Arthur made him Secretary of the Treasury, which office he held until his death. In September, 1882, he received the Republican nomination for governor of New York, but was defeated by Grover Cleveland by a majority of more than 190,000. He died in Geneva, New York, Sept. 4, 1884.

FOLGER, PETER, a colonial clergyman and writer; born in 1617, in England. He settled in Watertown, Massachusetts, in 1635, but soon moved to Martha's Vineyard. There, and in Nantucket, he became the leading spirit in the colonial life. He was a minister of the Baptist Church. His daughter, Abia, was the mother of Benjamin Franklin. He published several poems of some merit; the principal one, *A Looking-Glass for the Times* (1675), was much read at the time. He died in Nantucket, Massachusetts, in 1690.

FOLIATION. See GEOLOGY, Vol. X, pp. 315, 316.

FOLLY ISLAND, in Charleston County, southeastern South Carolina, is bounded on the southeast by the Atlantic, and on the landward side by Folly Island River, and extends from Lighthouse Inlet on the northeast to Stono Inlet on the southwest. It is in part heavily timbered.

FOLSOM, JOSEPH L., a California pioneer and soldier; born in Meredith, New Hampshire, May 19, 1817. After graduation from West Point in 1840, he served in the Seminole war and in outpost duty along the Northern frontier. He was for a time instructor in infantry tactics at West Point, and in 1846 was detailed for duty in the quartermaster's department in California. There he left the service and became a leader in the

early territorial organization. He was collector for the port of San Francisco from 1846 to 1848, and gave the first official report of the gold discoveries. He died in San José, California, July 19, 1855.

FOLSOM, NATHANIEL, an American Revolutionary statesman and soldier; born in Exeter, New Hampshire, in 1726. He was in command of a company during the French war of 1755, and for his part in the capture of Baron Dieskau was appointed a general of militia. He served in the Continental army before Boston in 1775; in 1774–75 and 1777–78 was a member of Congress; and in 1783 president of the New Hampshire constitutional convention. He died in Exeter, New Hampshire, May 26, 1790.

FOLSOM, NATHANIEL SMITH, an American clergyman; born in Portsmouth, New Hampshire, March 12, 1806. After his graduation from Dartmouth in 1828, and Andover in 1831, he was missionary to Georgia (1831–32); Presbyterian pastor in Cleveland, Ohio (1832–33); professor in Lane Seminary (1833); professor of Biblical literature in Western Reserve (1833–36); Congregational pastor in Frances, New Hampshire (1836–38), and Providence, Rhode Island (1838–40); Unitarian pastor at Haverhill, Massachusetts (1840–46); editor of the Charlestown (Massachusetts) *Christian Register* (1846–48); and from 1848 to 1868 was successively professor in the Meadville (Pennsylvania) Theological Seminary and pastor at Concord, Massachusetts. He moved to Boston in 1875. A *Translation of the Four Gospels* (1885) is his principal work. He died Nov. 10, 1890.

FOLWELL, WILLIAM WATTS, an American educator; born Feb. 14, 1833, in Romulus, New York. After graduation from Hobart College in 1857, he spent a year there as adjunct professor of mathematics, and in Germany two years. He took part in the Civil War as engineer, in which service he reached the rank of major. In 1869 he was appointed professor of mathematics at Kenyon College, Ohio, and president of the University of Minnesota later in the same year. He held the presidency for some years, and upon his resignation became professor of political economy and librarian. He published *Public Instruction in Minnesota* (1875) and *Lectures on Political Economy*.

FOLZ OR FOLCZ, HANS, German meistersinger. See GERMANY, Vol. X, p. 526.

FONDA, a village and the capital of Montgomery County, central eastern New York, situated on the Mohawk River, and on the New York Central and Hudson River and Fonda, Johnstown and Gloversville railroads, 42 miles N.W. of Albany. It has knitting-mills and manufactories of flour and carriages; industries, chiefly dairying and farming. Population 1890, 1,190.

FOND DU LAC, a city of southeastern Wisconsin, capital of Fond du Lac County (see Vol. IX, p. 361). It is an important business center, situated in the midst of a fine farming region. It has good water communications, excellent railroad connections and large manufactories of lumber, sashes, doors and blinds and agricultural implements. Its principal public buildings are a courthouse, opera-house and high school. It is noted for the number and excellence of its artesian wells, has extensive water-works, and is lighted by gas and electricity. Population 1880, 13,094; 1890, 11,942; 1895, 13,051.

FONSECA, JUAN RODRIGUEZ DE, a Spanish statesman and archbishop, the enemy of Columbus; born in Toro in 1451. As dean of Seville, he opposed Columbus, and later, as bishop of Rosanna and privy councilor to Ferdinand, took advantage of his position to reduce the power of Columbus, and to attempt to wreck the West Indian colonial enterprises. He was known as a man of remarkable brilliancy and of a vicious nature. He directed the slaughter of the Indians, and interfered with all colonizing expeditions. His power was broken by Charles V, but, through his priests, he continued his obstructive policy. He died in Burgos, March 4, 1524.

FONSECA, MANOEL DEODORO DA, the first President of the Brazilian Republic, was born in 1827. He was educated in Rio Janeiro, and on graduation entered the army. In the war between Brazil and Paraguay in 1865, he distinguished himself and rose to the rank of major. At the close of the war he was given a command in the province of Matto-Grasso. Subsequently, he was made a general and placed in charge of the cartridge factory and magazine at Rio Janeiro, where he organized a military club, in which he became very popular. The influence he gained here over his brother officers was used by him, it is said, to foment discontent in the army, and for the spread of republican ideas, with which he had become imbued, and the imperial authorities therefore transferred him to Matto-Grasso, of which he subsequently became governor. His removal from the Brazilian capital did not, however, stifle the military discontent, which culminated in November, 1889, in an uprising of the army, the expulsion of Emperor Dom Pedro and family, and the proclamation of a republic, of which Marshal Fonseca was elected the first President, Feb. 25, 1890. He proved to be a self-seeking and oppressive ruler, and in 1891 assumed the role of dictator and dissolved the Congress. He was, in turn, the victim of a revolution (Nov. 23, 1891), which placed Vice-President Peixotto in the presidential chair. He died Aug. 23, 1892.

FONSECA BAY. See HONDURAS, Vol. XII, p. 130.

FONTANELLE, a post hamlet of Washington County, central eastern Nebraska, on the Elkhorn River, 10 miles N.E. of Fremont. It is the seat of a Congregational college.

FONTANELS, the membranous spaces in the infant cranium between the frontal and parietal bones, and, also, between the parietal and occipital, at the two extremities of the sagittal suture. These spaces are gradually closed by the bone-growth, so that they rarely exist after two years. They are noticeable in a very young child by the perceptible palpitation. In surgery, a fontanel, or fonticulus, is a small ulcer, intentionally produced

for the discharge of humors from the body. The insertion of a small, hard substance in a flesh-cut, causing slight suppuration, accomplishes this result. It is rarely employed in modern surgery.

FONTENOY, a village of western Hainaut, south Belgium, where, on May 11, 1745, a battle was fought between Marshal Saxe and the Duke of Cumberland. See CUMBERLAND, Vol. VI, p. 705; SAXE, XXI, p. 346.

FONVIELLE, WILFRID DE, a French scientist; born in Paris, July 26, 1826. He engaged in journalism early in his career, but for his part in the revolution in 1848 was arrested and exiled to Algiers. There he was one of the editors of *Algérie Nouvelle* until the paper was suppressed. He returned to Paris and devoted himself to scientific investigation. He became well known as an aëronaut. He published, among his scientific writings, *Fossil Man* (1865); *Wonders of the Invisible Earth* (1866); and a number of popular works on north polar exploration, etc. He took an active interest in political affairs, and always on the side of the republic. He published a number of pamphlets, which include *How Republics Perish*.

FOOD is whatever feeds the body, and hence

COMPOSITION OF ANIMAL FOODS.

FLESH, ETC., FREED FROM BONE, SHELL AND OTHER REFUSE.

KINDS OF FOOD MATERIALS. (*Italics* indicate European analysis; the rest are American.)	Water.	Total Nutrients.	NUTRIENTS.			
			Nitrogenous (albuminoids).	Fat.	Carbohydrates.	Ash.
Meats (Fresh).	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Beef, side, well fattened	54.6	45.4	17.2	27.2	----------	1.0
Beef, lean, nearly free from fat	76.0	24.0	21.8	0.9	----------	1.3
Beef, round, rather lean	66.7	33.3	23.0	9.0	----------	1.3
Beef, sirloin, rather fat	60.0	40.0	20.0	19.0	----------	1.0
Beef, neck, "second cut"	64.5	35.5	19.9	14.5	----------	1.1
Beef, liver	69.5	30.5	20.1	5.4	3.5	1.5
Beef, tongue	63.5	36.5	17.4	18.0	----------	1.1
Beef, heart	56.5	43.5	16.3	26.2	----------	1.0
Veal, lean	78.8	21.2	19.9	0.8	----------	0.5
Veal, rather fat	72.3	27.7	18.9	7.5	----------	1.3
Mutton, side, well fattened	45.9	54.1	14.7	38.7	----------	0.7
Mutton, leg	61.8	38.2	18.3	19.0	----------	0.9
Mutton, shoulder	58.6	41.4	18.1	22.4	----------	6.9
Mutton, loin (chop)	49.3	50.7	15.0	35.0	----------	0.7
Meats (prepared).						
Dried beef	58.6	41.4	30.3	4.4	----------	6.7
Corned beef, rather lean	58.1	41.9	13.3	26.6	----------	2.0
Smoked ham	41.5	58.5	16.7	39.1	----------	2.7
Pork, bacon, salted	10.0	90.0	3.0	80.5	----------	6.5
Fowl.						
Chicken, rather lean	72.2	27.8	24.4	2.0	----------	1.4
Turkey, medium fatness	66.2	33.8	23.8	8.7	----------	1.3
Goose, fat	38.0	62.0	15.9	45.6	----------	0.5
Dairy Products, Eggs, Etc.						
Cow's milk	87.4	12.6	3.4	3.8	4.8	0.7
Cow's milk, skimmed	90.7	9.3	3.1	0.7	4.8	0.7
Cow's milk, buttermilk	90.3	9.7	4.1	0.9	4.0	0.7
Cow's milk, whey	93.2	6.8	0.9	0.2	5.0	0.7
Cheese, whole milk	31.2	68.8	27.1	35.4	2.4	3.9
Cheese, skimmed milk	41.3	58.7	38.3	6.8	9.0	4.6
Butter	9.0	91.0	1.0	87.5	0.5	2.0
Hen's eggs	73.1	26.9	13.4	11.8	0.7	1.0
Fish, Etc.						
Flounder, whole	84.2	15.8	13.8	0.7	----------	1.3
Haddock, dressed	81.4	18.6	17.1	0.3	----------	1.2
Bluefish, dressed	78.5	21.5	19.0	1.2	----------	1.3
Cod, dressed	82.6	17.4	15.8	0.4	----------	1.2
Whitefish, whole	69.8	30.2	22.1	6.5	----------	1.6
Shad, whole	70.6	29.4	18.5	9.5	----------	1.4
Mackerel, average, whole	71.6	28.4	18.8	8.2	----------	1.4
Salmon, whole	63.6	36.4	21.6	13.4	----------	1 4
						Salt.
Cod	53.8	26.1	21.7	0.3	----------	20.1 | 4.1
Smoked herring	34.5	53.8	36.4	15.8	----------	11.7 | 1.6
Salt mackerel	42.2	47.2	22.1	22.6	----------	10.0 | 2.5
Oysters	87.2	12.8	6.0	1.2	3.6	2.0

VEGETABLE FOODS.

KINDS OF FOODS. (*Italics* indicate European analysis; the rest are American.)	Water.	NUTRIENTS.				
		Nitrogenous (albuminoids).	Fats.	Carbohydrates, etc.	Wood Fiber.	Mineral Matters.
Foods.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Wheat flour, average	11.6	11.1	1.1	75.4	0.2	0.6
Graham flour (wheat)	13.0	11.7	1.7	69.9	1.9	1.8
Rye flour	13.1	6.7	0.8	78.3	0.4	0.7
Pearled barley	11.8	8.4	0.7	77.8	0.3	1.0
Buckwheat flour	13.5	6.5	1.3	77.3	0.3	1.1
Oatmeal	7.7	15.1	7.1	67.2	0.9	2.0
Maize meal	14.5	9.1	3.8	69.2	0.8	1.6
Hominy	13.5	8.3	0.4	77.1	1.3	0.4
Rice	12.4	7.4	0.4	79.2	0.2	0.4
Beans	13.7	13.2	2.1	53.7	3.7	3.6
Peas	15.0	22.9	1.8	52.4	5.4	2.5
Potatoes	75.5	2.0	0.2	20.7	0.8	1.0
Sweet potatoes	75.8	1.5	0.4	20.0	1.1	1.2
Turnips	91.2	1.0	0.2	6.0	0.9	0.7
Carrots	87.9	1.0	0.2	8.9	1.2	0.8
Cabbage	90.0	1.9	0.2	4.9	1.8	1.2
Cauliflower	90.4	2.5	0.4	5.0	0.9	0.8
Melons	95.2	1.1	0.6	1.4	1.1	0.6
Pumpkins	90.0	0.7	0.1	7.3	1.3	0.6
Apples	84.8	0.4	0.0	12.8	1.5	0.5
Pears	83.0	0.4	0.0	12.0	4.3	0.3
Starch	15.1	1.2	0.0	83.3	0.0	0.4
Cane sugar	2.2	0.3	0.0	96.7	0.0	0.8
Wheat bread	32.7	8.9	1.9	53.5		1.0
Graham bread	34.2	9.5	1.4	53.3		1.6
Rye bread	30.0	8.4	0.5	59.7		1.4
Soda crackers	8.0	10.3	9.4	70.5		1.8
Oatmeal crackers	4.9	10.4	13.7	69.6		1.4
Pilot (bread) crackers	7.9	12.4	4.4	74.2		1.1
Macaroni	13.1	9.0	0.3	76.8		0.8

includes air and water, but as generally understood, the term is used as referring to such food as requires digestion in the body. Food ought to embrace all the elements found in the body. These, as given by chemists, number 15. According to Professor Atwater's table, the following are the chemical constituents of the body of a man weighing 148 pounds:

		POUNDS.
5 GASES	Oxygen	92.4
	Hydrogen	14.6
	Nitrogen	4.6
	Chlorine	0.12
	Fluorine	0.02
3 METALLOIDS	Carbon	33.30
	Phosphorus	1.40
	Sulphur	0.24
7 METALS	Calcium	2.80
	Potassium	0.34
	Sodium	0.12
	Magnesium	0.04
	Iron	0.02
	Manganese	Traces.
	Copper	

While the body is composed of the 15 elements named above, and in the proportions there stated, it would be impossible to nourish it with them in their elementary condition.

The amount of food required daily, Huxley estimated thus: Lean beefsteak, 5,000 grains; milk, 7,000 grains; bread, 6,000 grains; potatoes, 3,000 grains; butter, 600 grains; water, about 6 pounds—taken as both food and drink, to supply the daily loss to the system. The water required for the system comes largely from the food, as is shown by Professor Atwater, in the preceding tables:

DIGESTING FOOD. For an account of the process of digestion, see NUTRITION, Vol. XVII, pp. 676, 677. The various juices of the alimentary canal which act upon the food are given in the following table, showing not only their names, but their uses, as taken from Roberts:

NAME.	FUNCTION.
1. *Ptyalin*, or salivary diastase, contained in the saliva.	1. Changes starch into dextrine and glucose.
2. *Pepsin*, contained in gastric juice.	2. In acid fluids, changes albuminoids into peptones.
3. *Curdling ferment*, contained in gastric juice.	3. Coagulates casein.
4. *Trypsin*, contained in pancreatic juice.	4. In alkaline solutions transforms proteids into peptones.
5. *Curdling ferment*, found in pancreatic juice.	5. Coagulates milk casein.
6. *Pancreatic diastase*, found in pancreatic juice.	6. Changes starch into dextrine and glucose.
7. *Emulsive ferment*, found in pancreatic juice.	7. Emulsifies fats.
8. *Bile*, poured into duodenum.	8. Assists in emulsifying fats.
9. *Invertin*, found in intestinal juice.	9. Converts cane sugar into inverted sugar.
10. *Curdling ferment*, found in intestinal juice.	10. Coagulates casein.

Relative Value of Vegetable and Animal Food. In practice, there are no distinctive flesh-eaters among us—none who avail themselves of the higher proportion of albuminoids and fat. All practically admit, in eating their ordinary dinner, that an excess of nitrogenous matter and fat is bad. They do so by mixing the meat with potatoes, the latter containing an excess of starch (carbohydrate) and a small amount of albuminoids and fat. The slice of meat mixed with the lump of potato brings the whole down to the average composition of a fairly arranged vegetarian meal. By a vegetarian repast is not meant mere cabbage and potatoes, but properly selected, well-cooked, nutritious vegetable food. As an example, take equal weights of beef and potatoes composing the meal, without bread, and we have the following analysis, according to the table given by Pavy:

Mixed Dinner.	Water.	Albumen.	Starch.	Sugar.	Fat.	Salts.
Lean beef	72.00	19.30	------	------	3.60	5.10
Potatoes	75.00	2.10	18.80	3.20	0.20	0.70
	147.00	21.40	18.80	3.20	3.80	5 80
Mean composition	73.50	10.70	9.40	1.60	1.90	2.90

Compare with the above the meal furnished to the poor in Munich by Count Rumford's soup (without bread—afterward added) No. 1, composed of equal measures and weights of peas and pearl-barley or barley meal. Their percentage of composition was as follows:

Rumford's Soup.	Water.	Albumen.	Starch.	Sugar.	Fat.	Salts.
Peas	15.00	23.00	55.40	2.00	2.10	2.50
Barley meal	15.00	6.30	69.40	4.90	2.40	2.00
	30.00	29.30	124.80	6.90	4.50	4.50
Mean composition of mixture	15.00	14.65	62.40	3.45	2.25	2.25

Here, then, in one hundred parts of the material of Rumford's halfpenny dinner, as compared with the "mixed diet," we have forty per cent more of nitrogenous food, more than six and a half times as much carbohydrate in the form of starch, more than double the quantity of sugar, about seventeen per cent more of fat, and only a little less of salts (supplied by the salt which Rumford added).

The great German scientific philanthropist states that he found that less than five ounces of solids was sufficient for each man's dinner. He was supplying far more nutritious material than beef and potatoes, and therefore his five ounces were more satisfactory than a pound of beef and potatoes, three fourths of which is water, for which water the buyer pays a good round price per pound when he buys his prime steak. Count Rumford added the water at pump cost, and, by long boiling, claimed to have caused some of it to unite with the solid materials (by the hydration), and then served the combination in the form of porridge, raising each portion to 19¾ ounces.

Cheap Dinners for School Children. During the last few years experiments have been made on an extensive scale, in different countries in Europe, in order to test the cost, healthfulness and popular approval of a system of cheap dinners for the benefit of the national and board schools. The editor of these supplementary volumes is indebted to George Herbert Sargent of Birmingham, England, one of the founders and chief promoters of the system, for numerous documents setting forth the results of such experiments in various parts of Great Britain and on the Continent. The limits prescribed for this article permit the insertion of only a few of the many tables reported. In the Kendal district, cheap dinners were started for the supply of two country schools about one mile apart. The managers provided the following plant: One hundred soup-plates, 100 small spoons, one eight-gallon iron pan, one five-gallon can, 20 basins, one pair of scales, two ladles, and one bucket. The dinners were served in a vacant cottage, free of rent in each case, near the school, by a woman who was paid 25 cents per day. Fuel cost 35 cents per week. The *menu* was the following:

On Mondays, Tuesdays and Thursdays, soup and hash—

Soup.	Hash.
5 lbs. peas,	70 lbs. potatoes,
3 lbs. barley,	1½ lbs. onions,
2 lbs. bones,	8 oz. salt,
¼ lb. beef dripping,	¾ oz. pepper,
½ lb. onions,	3 lbs. meat.
6 oz. salt,	
½ oz. pepper.	

On Wednesdays and Fridays, hash and pudding—

Hash.	Pudding.
49 lbs. potatoes,	17½ lbs. flour,
1½ lbs. meat,	1 lb. lard,
1 lb. onions,	2 baking-powders,
6 oz. salt,	4 lbs. treacle or preserve,
½ oz. pepper.	Salt.

The quantities given were sufficient for 80 children; the average number present, 72. The pupils who were able to pay were charged one English penny for a single dinner, or four-pence per week, the dinner being served on the five school days. In case of deficiency caused by free dinners the lack was supplied from private sources.

The nutritive value of the cereals and pulses (wheat, barley, oats, beans, peas and lentils) is as 3 to 1 when compared with meat; its economy, as 18 to 1.

G. H. Sargent had reported from the city of Birmingham, in a period of five months, a total of about 300,000 school dinners, of which the following were from the kitchen under his own charge:

		Costing.
9,833½	at a halfpenny (paid for), costing about	$102
4,709½	at a halfpenny (free)	49
30,381	at a farthing (paid for)	155
104,097	at a farthing (free)	540
17,210	at 30 for 1s. (free)	120
166,231		$966

His experience is thus summarized:

It has been found that two or three of our dinners a week, given throughout the winter to half-starved children, in addition to what they could get before, change them from a pinched to a fairly well-fed condition, fill them with life and spirits instead of dullness and misery. The popularity of the soups is tested in the simplest way; no compulsion whatever is laid on the children to finish what is given them. They are not pressed—or even encouraged—to eat more than they feel an inclination for; yet we rarely find, as we often did when the dinners were far more costly, that any is left. The very cheapest dinners are by far the most popular. Peas and lentils meet another distinct want. It has been noticed that the children prefer something moderately solid. This legumes just supply; they retain enough hardness when cooked to want biting, but not enough to make them indigestible. They have, further, these enormous advantages: when one has once learned where to buy and how to cook them, they are very cheap and give very little trouble."

USE OF SALT IN FOOD. Common salt is of immense importance in the processes ministering to the nutrition of the body, for not only is it the chief salt in the gastric juice, and essential for the formation of bile, and may hence be reasonably regarded as of high value in digestion, but it is an important agent in promoting the processes of diffusion, and therefore of absorption. Says the London *Lancet:*

"Direct experiment has shown that salt promotes the decomposition of albumen in the body, acting, probably, by increasing the activity of the transmission of fluids from cell to cell. Nothing can demonstrate its value better than the fact, that if albumen without salt is introduced into the intestine of an animal, no portion of it is absorbed, while it all quickly disappears if salt be added. If any further evidence were required, it would be found in the powerful instinct which impels animals to obtain salt. Buffalos will travel for miles to reach a 'salt-lick'; and the value of salt in improving the nutrition and the aspect of horses and cattle is well known to every farmer. The popular notion that the use of salt prevents the development of worms in the intestine has a foundation in fact, for salt is fatal to the small thread-worms, and prevents their reproduction by improving the general tone and the character of the secretions of the alimentary canal. The conclusion, therefore, is obvious, that salt, being wholesome, and indeed necessary, should be taken in moderate quantities, and that abstention from it is likely to be injurious."

FOOLS, FESTIVAL OF, a mediæval Christian feast, simulating the Saturnalia of the Romans, celebrated in many countries of Europe, but particularly in France. It fell chiefly on the 1st of January in each year, but more or less occupied the whole period between Christmas and Epiphany (January 6th). In its observance the chief performers were of the lower clerical orders, and the professed aim was to interest the young and the ignorant in the Advent; but it became a mere travesty of all the more sacred rites of Christianity, and was condemned by prelates and councils. The donkey played such a frequent part in it that the pageant was often called "the Feast of Asses." In some places the ass of Balaam was represented; in others, the ass which stood beside the manger in which the infant Saviour was laid. In every instance there was more or less attempt at dramatic representation, the chief church of the place being generally the theater, and the words and action of the drama being often ordered by its book of ceremonies. Where the ass was not introduced, the chief point of the farce lay in the election of a mock pope, patriarch, cardinal, archbishop, etc. These mimic dignitaries assumed such titles as "Pope of Fools," "Cardinal of Numskulls," etc. They took possession of the churches, and often travestied the performance of the church's highest office, the mass. The Festival of Fools maintained itself in many places till the Reformation in the sixteenth century. A description of it at Antibes, France, in 1644, is given in a letter to the philosopher Gassendi.

FOOL'S PARSLEY, the common name of *Æthusa Cynapium*, an umbelliferous plant, a common poisonous weed in gardens and fields in most parts of Europe. It resembles parsley in its foliage and general appearance, so that serious accidents have occurred from its being mistaken for that herb.

FOOT. See ANATOMY, Vol. I, pp. 830, 841, 842; MAMMALIA, Vol. XV, pp. 360, 361; ANTHROPOLOGY, Vol. II, p. 108; APE, Vol. II, pp. 162, 163.

FOOT, in music, a term used in the same way as in poetry, denoting a sort of melodic figure of notes with only one accent. A foot is made up of two, three or four syllables; and two feet, in general, form a meter. Foot is also used in speaking of the pitch of sounds. The Germans have always used the word *fusston* in representing the pitch of the different stops of an organ. As a unison stop is called an eight-foot stop, because in this case the pipe is about eight feet long, an octave stop is called a four-foot stop, a double or suboctave stop a 16-foot stop, etc.

FOOT. See WEIGHTS AND MEASURES, Vol. XXIV, pp. 483, 484, 489, 490.

FOOT, SOLOMON, an American lawyer and public man; born in Cornwall, Vermont, Nov. 19, 1802. From the time of his graduation from Middlebury (in 1826) until his admission to the Vermont bar (in 1831), he was engaged in teaching. In 1833, 1836–38 and 1847 he was a member of the legislature; from 1843 to 1847 a member of Congress; and from 1851 to 1866 United States Senator from Vermont. He was a Whig until 1854, when he became a Republican. He died at Washington, District of Columbia, March 28, 1866.

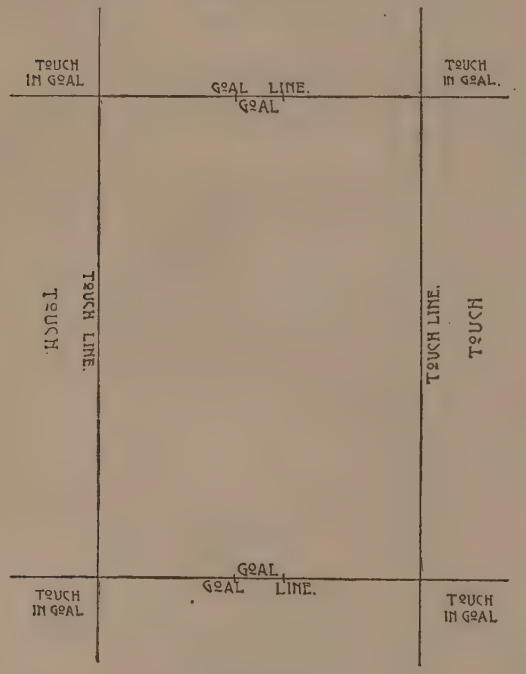
*FOOTBALL, a game highly popular in colleges and universities in the United States. To the account of it given in Vol. IX, p. 367, of this ENCYCLOPÆDIA, there may be advantageously added a later statement of its expansion into new forms and its principal recent modifications. Football is one of the oldest, if not the oldest, of athletic sports. The Greeks are said to have had a type of this sport, which they called ἁρπάστον, and there was a game indulged in by the Romans, played, however, rather more with the hand than with the foot, but which partook of some of the traits of the latter-day football. This was called the Follis. In the very earliest accounts of English national sport we find a record of this rough but sturdy game. In these primitive times whole townships contended one against the other, and the contest often lasted all day. In it much

*Copyright, 1897, by The Werner Company.

roughness occurred, and it partook of a lawlessness which caused it to come into considerable disfavor with the property classes.

There is a legend that the first football was the head of a Dane that was kicked about on the Roodee, at Chester, on Shrove Tuesday. At any rate, from as early as the twelfth century (see Fitz Stephen's *History of London*) the game was the great Shrove Tuesday sport. Edward II, Henry IV, Edward III, Richard II and James III all issued decrees against the sport, but it has kept its vitality in spite of edicts, and it is played wherever the British colonist has gone. Its history, when translated, is a repetition of the story of opposition, but, in the end, the game takes root and is, apparently, more tenacious of life than any other sport.

The game is played upon any level field by teams of from eleven to twenty players. The object of each side is to send the ball in the direction of



RUGBY

the opponents' end of the field, where scoring is possible, either by getting the ball past a certain line, or through or over a goal there set up. There are at present two general divisions of the sport, one characterized as the running, and the other as the kicking or dribbling game. Not but that the ball is kicked in both schools, but in the running game it can be carried in the hands or arms, while in the kicking game it must be advanced in other ways.

The principal varieties of the sport are known as the Rugby and the Association. But besides these, and coming from as well as very directly influenced by them, are the American-Intercollegiate, the Gaelic, the Australian and some special varieties of football played in parts of Canada. The two chief divisions of Rugby and Association may be traced still farther back, into the schools where they were played before being taken up by the universities or the general public. The Rugby or running game was played, not alone at Rugby, but at Cheltenham, Marlborough and other schools, while the Association or kicking game came from Eton, Harrow, Westminster, Charterhouse and other less-noted schools. Winchester had a game by itself, which it still preserves.

Association football is in reality an offshoot of the running or Rugby game, although it is now the head of the kicking school, as in distinction

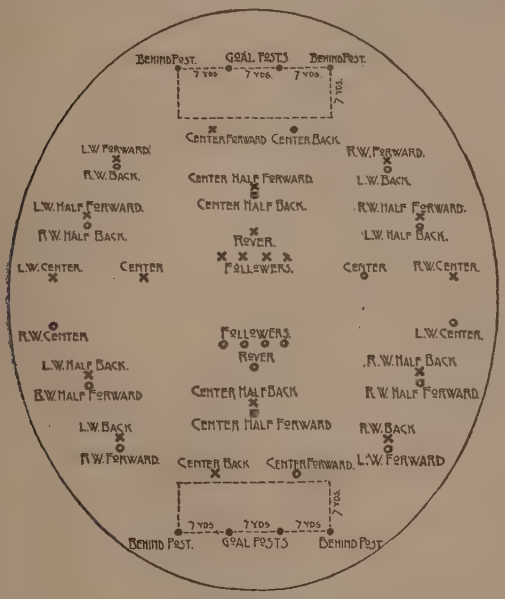
ASSOCIATION.

from Rugby, the parent of the running game. No carrying or batting the ball is allowed, and to score a goal the ball must be kicked between the goal-posts and under the goal-bar. The Association game is the most generally played sport in England, and it has been taken up by professionals, so that it stands in that respect to university football in England much as the American professional baseball does to the college game.

In one sense, there are no "Canadian" rules, for British Columbia, Manitoba and the maritime provinces play the English Rugby. Ontario and Quebec have an organization known as the Canadian Rugby Union, and the game played under their rules is the one most generally known to

football players as the Canadian game. The Canadian game differs from the English Rugby Union in several features, but is more closely allied to that branch than to the American Intercollegiate. Its principal points of difference from the latter are in greater strictness on the off-side rule, and the more immediate putting of the ball in play after a "down," thus not admitting of the men taking up special positions, as they do, under signal, in the American Intercollegiate.

Gaelic football is one of the oldest of Irish pastimes, and one lately revived both there and in America, principally on the Pacific Coast. The game is played by teams of fifteen men, whose positions are as follows: One goal-keeper, two full-backs, two half-backs, three centers, two forwards, two wing-forwards, one full-forward. The point-posts are a distinguishing feature; a ball passing between these, but missing the goal, counts a point. Another distinctive feature is that of putting the ball in play. The players of both sides are drawn up in two parallel lines at the center of the field, each man holding the hand of a player on the opposite side. The referee, standing at the end of the line, throws the ball up

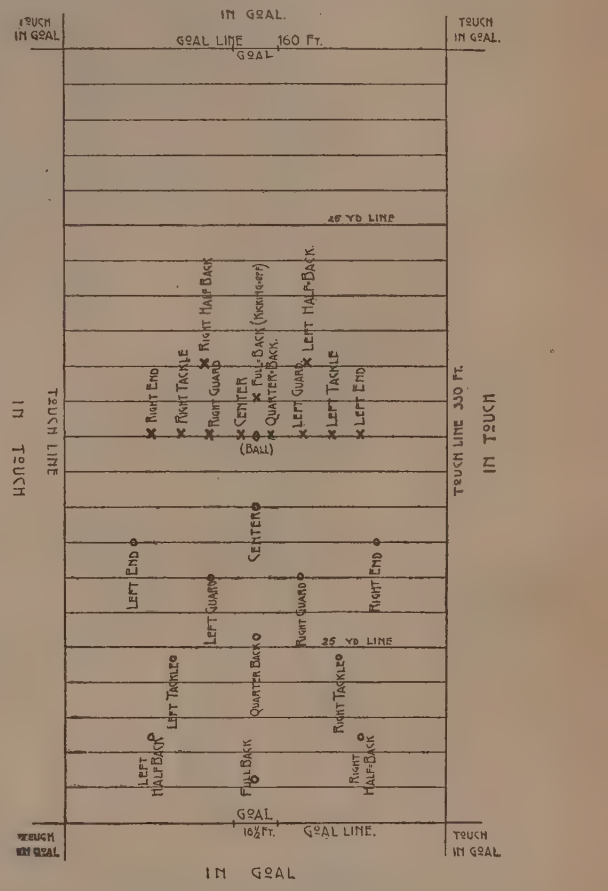


AUSTRALIAN.

into the air so that it will fall about the center of the line. Thereupon the players let go hands and the play begins. The ball may be propelled only by kicking with the foot or striking with the hand, but cannot be thrown or carried. A favorite method of progress with the ball is what is called "hopping"; that is, bounding the ball on the ground by successive pats with the hand.

The Australian game is the product of the inventive genius of the British player, when far enough from home to be free from conservatism. Its arrangement of players, as will be seen from the diagram, is decidedly intricate, and its chief features lie in the radical alteration of the positions.

But of all these games the youngest and the one that offers the greatest incentive for original development is the American Intercollegiate. This is due to the expansion of its laws, which are framed and annually revised with the intent of leaving as great a field for independent and original plays as possible. Free from the bonds of a tradition which might forbid a certain play as unlawful, merely because it had never been used,



AMERICAN INTERCOLLEGIATE.

the American captain and coach plan out and adapt all new arrangements of attack and defense that they can devise, and the contests, therefore, are of extreme interest, drawing often as many as forty thousand people.

The play is after the Rugby order, as the American Intercollegiate rules were originally adopted from that game, but the principal difference now lies in the outlet of the scrimmage and in the allowance of interference to aid the runner. Instead of the indeterminate methods of the Rugby scrimmage, the ball is snapped out to a quarter-

back, who has in his charge, practically, the direction of the entire play, and who is able to pass the ball from his position to a player at any point in the field behind him. The interference is a method of off-side play, and for that reason not so generally accepted as an improvement upon the English style, as is the outlet for the scrimmage. The American Intercollegiate is played with 11 men on a side, and the detail of each position is highly developed.

WALTER CAMP.

FOOTE, ANDREW HULL, an American naval officer; born in New Haven, Connecticut, Sept. 12, 1806. He entered the navy as midshipman in 1822, became lieutenant in 1830, and in 1849 was made captain. At the beginning of the Civil War he was put in command of the western flotilla. In 1862 he received a vote of thanks from Congress for services rendered in connection with the capture of Forts Henry and Donelson and Island No. 10, and was made rear-admiral. He was obliged to withdraw from active service on account of injuries received at the assault on Fort Donelson. He was placed in charge of the Bureau of Equipment and Recruiting. In the following year he was chosen to succeed Rear-Admiral Dupont; but while on his way to assume command of the fleet, which was off Charleston, he died in New York City, June 26, 1863, of a wound received a year previous.

FOOTE, HENRY STUART, an American public man; born in Fauquier County, Virginia, Sept. 20, 1800. He was admitted to the bar in 1822, three years after his graduation from Washington College, Virginia; acquired an extensive practice in Jackson, Mississippi, and in 1844 was a Presidential elector. From 1847 to 1852 he was a United States Senator from Mississippi, and then served as governor of his state till 1854. He was subsequently a member of the Confederate Congress. He was a Unionist before the Civil War, and, although taking part in the Confederacy, was opposed to the continuance of the war. After the Civil War General Grant made him superintendent of the United States mint at New Orleans. He held this position till shortly before his death. He published *Texas and the Texans* (1841); *The War of the Rebellion* (1866); *Bench and Bar of the South and Southwest* (1876); and *Personal Reminiscences*. He died in Nashville, Tennessee, May 20, 1880.

MARY HALLOCK FOOTE.

FOOTE, MARY HALLOCK, an American authoress and illustrator; born in Milton, New York, Nov. 19, 1847. She studied illustration at the Cooper Union, New York, and engaged in book-illustrating until 1876, when she married Andrew De Wolf Foote, a mining engineer. She accompanied her husband to Colorado, where she was afforded ample opportunity to study nature and Western life. She published a number of stories of camp-life, all of which are illustrated with original drawings by herself. Her tales include *The Led Horse Claim* (1883); *John Bodewin's Testimony* (1886); *The Last Assembly Ball* (1888); *Cœur d'Alene* (1894); and *The Cup of Trembling, and other Stories* (1895). Her best-known illustrations are those for Osgood and Company's *Hanging of the Crane; Scarlet Letter;* and *Skeleton in Armor*.

FOOTE, SAMUEL AUGUSTUS, an American public man; born in Cheshire, Connecticut, Nov. 8, 1780, and graduated from Yale in 1797. He served in the Connecticut legislature for several years, and in 1819–21, and again in 1823–25, was a member of Congress. In 1827–33 he occupied a seat in the United States Senate. He was again in Congress in 1833–34, and then was governor of Connecticut for one term. In 1844 he was a Presidential elector. While in the Senate he offered a resolution, the purport of which was to secure the limitation of further sales of public lands to those already offered for sale, and which called forth the famous Webster-Hayne debate.

FOOT-ROT, a hoof-disease among sheep. The disease exists in two varieties. The common form consists of a superfluous growth of hoof, causing it to turn down, crack, etc., at the toe, and, when neglected, to separate from the sensitive parts beneath, and cause ulcers, proud flesh and general soreness. It is caused by a sudden change of the sheep from a rocky, scanty pasturage to a rich, soft one. The remedies to be used depend upon the advancement and severity of the case. In the earliest stage a careful paring of the hoof will prevent serious results; later stages require a treatment of tar; and still later a caustic or active astringent application is necessary. For such an astringent butter of antimony diluted with an equal quantity of myrrh is a good remedy when carefully administered. The safest remedy is a fluid caustic of equal weights of flowers of sulphur and finely powdered sulphate of copper mixed with lard or oil. The second form of the disease is termed "foul in the foot." This is more troublesome, and begins in the interdigital space. The foot is hot, tender and swollen around the coronet. A separation of the toes results from the ulcerations. Poultices should be applied in the severer cases, and in the milder forms the parts should be washed with a solution of chloride of zinc and the foot protected with a leather boot.

FORAGE, hay, straw and oats supplied to horses of officers and soldiers in the army. Where troops are together, the provisions of forage devolves on the commissariat. Officers of the staff, etc., who are entitled to horses, but whose duties are at stations where bodies of horses are not collected, receive a money allowance, in lieu of forage in kind, varying according to the place and price of provender. According to the regulations of the United States army, an allowance is made for each horse of 14 pounds of hay and 12 pounds

of grain, generally oats, daily. A mule is given but 9 pounds of grain, with 14 pounds of hay.

FORAGE PLANTS OF THE UNITED STATES. See GRASSES, Vol. XI, pp 53–60 for description of the true grasses (*Gramineæ*). The majority of important forage plants are members of this great family, which is of more economic importance to man than all others of the plant kingdom. Popularly, the term *grass* is applied to all those plants which are used for pastures and meadows—a classification founded upon use alone, disregarding the distinctive features. A true grass has simple leaves, a stem generally jointed and tubular, the husks or glumes in pairs, and the seed single. This definition includes wheat, rye, oats, etc., and excludes clover, and some other plants commonly called grasses. In this article, however, there are also described important forage plants, which, though not true grasses, find much use in agriculture. Of the special adaptation of different forage plants to different sections of the United States, little is known. There are many climates, many kinds of soil and many degrees of aridity and moisture, and no one species of grass is equally adapted to all parts of this extensive territory; yet not more than a dozen species have been successfully introduced. This number answers, with a tolerable degree of satisfaction, the wants of quite an extensive portion of the country, chiefly the northern and cooler regions; but in other localities the same kinds of grasses do not succeed equally well. This is particularly the case in the Southern and Southwestern states, the arid districts of the West, and in California. To discover successful varieties for such regions is largely a matter of experiment and observation.

The grasses most generally cultivated in the United States are: 1. Red clover (*Trifolium pratense*); 2. White or Dutch clover (*T. repens*); 3. Timothy (*Phleum pratense*); 4. Blue-grass (*Poa pratensis*); 5. Wire-grass (*Poa compressa*); 6. Red-top (*Agrostis vulgaris*); 7. Orchard-grass (*Dactylis glomerata*); 8. Fowl meadow-grass (*Poa serotina*); 9. Meadow-fescue (*Festuca pratensis*) and 10. Alfalfa, or lucerne (*Medicago sativa*). For feeding during droughts, Indian corn, sown at the rate of two bushels per acre, in drills two feet apart, cultivated thoroughly once or twice, and cut when in blossom, will make a good reliance, as also will German millet (*Panicum Germanicum*) and common millet (*P. miliaceum*). Above are designated ten species of forage plants that do well under ordinary conditions; 1, 2, 3, 4, 5 and 6 constitute the bulk cultivated for pasture, and 1 and 3 for hay; 7 is one of the most valuable in the whole list, and is always worth trial, unless the land to be grown over is exceptionally low and wet; 8 and 9 are well worthy of trial; 10 is the most successful forage plant of the irrigated and moist portions of the Southwest. Fowl meadow-grass, especially, has been found to take the place of blue-grass in those sections of the Northwest where blue-grass does not succeed. The hay is especially valuable for horses, it having all the advantages of wild hay, being free from the dust that infests timothy and clover, while it possesses all the nutriment of the best cultivated hay, and dairymen pronounce it valuable hay for milch cows. Meadows of timothy alone are, when well managed, very satisfactory and profitable. It is also common to combine red clover with timothy in various proportions. In low, wet meadows, red-top is considerably employed, and it is a common constituent of pastures in all the Northern states. Some species of grass are best adapted to clay-lands, some to sandy soils, some to loam, some to dry upland, and some to lowland; and, under such special conditions, the grass most suitable should be used alone. Generally, however, a mixture of five or six suitable varieties will yield a larger crop than one alone. The mixture of several kinds, perhaps, is most valuable in land that is intended for pasturage, as then they reach maturity at different times and furnish a succession of good feed, and also cover the ground more uniformly and completely. For a permanent pasturage, under most circumstances, the following kinds, in proper proportions, make a good mixture: June grass (blue-grass), foxtail (*Alopecurus pratensis*), red-top (bent-grass), timothy, tall fescue and perennial rye-grass. For an immediate pasture the following mixture is generally satisfactory: Blue-grass, 8 pounds; orchard-grass, 4 pounds; timothy, 4 pounds; red clover, 6 pounds.

In all new countries the dependence must, of course, be first upon the wild grasses. As a rule, these have not been sufficiently appreciated. Many of them are of exceeding value, but, unfortunately, are, as a rule, sparse seeders, and hence are apt to be neglected. The trouble is, that farmers, as a class, do not investigate and experiment enough for themselves. Thus they are content with the most meager list of grasses, and, as a result, for a good part of the season their stock finds insufficient food of proper succulence, and, oftentimes, is really distressed for subsistence.

Chemical Composition of American Grasses. Of late years considerable attention has been given to the chemical composition of grasses, and much information has been gained concerning their nutritive value. The determinations of the grasses given in the above list of those commonly cultivated in the United States will be found in the table on the following page.

The specimens used were from various parts of the country, and grown under several conditions of soil and environment. The stage at which analyses were made was, in nearly every case, full bloom or slightly later, that being the period at which grasses are usually cut for hay. The analyses have been calculated for "dry substance," and also for fresh grass where the amount of water in the fresh grass had previously been determined, otherwise for the amount of water in hay. The great variation in composition of grasses becomes apparent on examining a table of 136 analyses, given in the special bulletin of the United States Department of Agriculture on the

agricultural grasses and forage plants of the United States for 1889. The highest and lowest determinations, selected from this table, are shown in the following list of extremes:

Dry Substance.	Highest.	Lowest.
Ash	19.24	3.57
Fat	5.77	1.48
Nitrogen—free extract	66.01	34.01
Crude fiber	37.72	17.68
Albuminoids	23.13	2.80
Nitrogen	3.70	.45
Non-albuminoid nitrogen	1.64	-- --
Per cent of nitrogen, non-albuminoid	60.70	-- --
Water in fresh grass	76.50	60.00

The highest ash is undoubtedly owing to the presence of adherents oil, and the lowest carbohydrates are dependent, relatively, on the same cause. The wide variations in fiber and albuminoids must be regarded, however, as being entirely due to physiological causes, which are difficult to explain. Species are not, in themselves, at all fixed in their composition, there being as large variations among specimens of the same as between specimens of different species.

Grass and Forage Crops. Of the native grasses of the United States, the timothy, or cattail, (*Phleum pratense*) is of first importance. It attains to perfection on rich clays and loams in the middle states, and yields, under favorable circumstances, a ton and a half to two tons of hay per acre. It is a hardy grass, of luxuriant growth, and its nutritive qualities are universally recognized. It is, also, a valuable crop for seed, an acre of prime grass yielding from fifteen to twenty-five bushels of clean seed, which is usually worth, in the market, from two to four dollars per bushel, and the stalks and chaff that remain make a useful fodder for most kinds of stock. It may be sown on wheat or rye in August or September, or in the spring. When sown alone or with other grasses, early in the season, on a rich soil, it will produce a good crop the same year.

The blue-grass of Kentucky, otherwise known as June grass, is an early grass, very common in the soils of New England and the West, in pastures and fields, constituting a considerable portion of the turf. It varies very much in size and appearance, according to the soil on which it grows. In Kentucky it is universally known as blue-grass, and is considered the most valuable of all the pasture-grasses. It comes into the soil in some parts of the country when left to itself, and grows luxuriantly and is relished by cattle.

Meadow foxtail is a valuable pasture-grass, on account of its early and rapid growth, and of its being greatly relished by stock of all kinds. It thrives best on a rich, moist, strong soil, and shoots up its flowering stalks so much earlier than timothy, that it need not be mistaken for that grass, though it closely resembles it. It is superior to timothy as a permanent pasture-grass.

Orchard-grass is one of the most valuable and widely known of all the pasture-grasses. It is common to every country in Europe, to the north of Africa and to Asia, as well as to America. Its culture was introduced into England from Virginia, where it had been cultivated some years previously, in 1764. Its rapidity of growth, the luxuriance of its aftermath, and its power of enduring the cropping of cattle, commend it highly to the farmer's care, especially as a pasture-grass.

Meadow spear-grass, nerved manna-grass (*Glyceria nervata*), is the fowl meadow of many farmers, while the grass commonly called fowl meadow by others (*Poa serotina*) often goes with them under the name of bastard fowl meadow. It is a native American grass, the nutritive value of which is equal at the time of flowering and when the seed is ripe, while the nutritive matter of the lattermath is said to be greater than that of most other grasses.

Hungarian grass, Hungarian millet (*Panicum Germanicum*), is an annual forage plant introduced into France in 1815, where its cultivation has become considerably extended. It germinates readily, withstands the drouth remarkably, remaining green even when other vegetation is parched up, and if its development is arrested by dry weather, the least rain will restore it to vigor. It has numerous succulent leaves, which furnish an abundance of green fodder, very much relished by all kinds of stock.

Broom-corn (*Sorghum saccharatum*) is considered, by some botanists, as a variety of *Sorghum vulgare;* by others, as a distinct species. Its leaves are linear; ligules short and hairy; panicle with long, loose, expanding branches. It is an annual, and flowers in August, growing from six to nine feet high. It is a native of India.

The panicles are used for brooms, and the seeds for poultry, hogs, etc. It is extensively cultivated in many parts of the country, along the Connecticut River, in Massachusetts; the Mohawk, in New York; and at the West. It is said to have been first cultivated in this country by Dr. Franklin.

Red clover (*Trifolium pratense*) is one of the most valuable and economical forage plants. It belongs to the pulse family, or *Leguminosæ*, which includes the larger portion of forage plants called artificial grasses, in distinction from the *Gramineæ*, the only true, and often called the natural, grasses.

White clover is widely diffused over this country and all the countries of Europe. It is indigenous, probably, both to England and America. Its chief value is as a pasture-grass, and it is as valuable for that purpose as the red clover is for hay or for soiling.

The yellow clover, hop-trefoil, or shamrock (*Trifolium procumbens*), like the white, is of spontaneous growth, very hardy and prolific. It bears a yellow flower and black seeds.

Alfalfa, or lucerne (*Medicago sativa*), is one of the most productive plants for forage ever cultivated. It was extensively cultivated by the Greeks and other nations of antiquity for many centu-

ries, and it has been a prominent object of attention in Italy, Spain, France, Holland and Flanders. Its relative value, as compared with clover (*T. pratense*), is decidedly inferior, while its absolute value per acre is much greater. It was early introduced into this country. It bears from three to five crops per annum, producing from three to eight tons of hay. Our climate in the Northern and middle states is too cold for it, but it grows luxuriantly in California, Arizona, New Mexico, Utah and Colorado. It must have a deep, loamy soil, free from weeds, and well filled with manure.

East India giant clover (*Polygonum Sachalinense*), introduced into the United States from Europe, being a native of Russia, is regarded of great value for forage in the arid regions of the Western and Southwestern states. It grows with luxuriance in territory formerly regarded unfit for grazing purposes, and attains a height of from 8 to 12 feet. It is a thick-growing, bushy plant, with large succulent leaves, and will produce from 80 to 120 tons per acre of green forage. Since it requires a minimum amount of moisture, and is such a rank grower, it is regarded of great value in the breeding of cattle on a large scale.

In addition to the article to which reference is given at beginning, see also bulletins of the Department of Agriculture on the grasses and forage plants of the United States, and AGRICULTURE, in these Supplements.

JOHN G. COULTER.

FORAKER, JOSEPH BENSON, an American statesman; born near Rainsboro, Ohio, July 5, 1846. He entered the army when 16 years of age, and served to the end of the war, in the army of the Cumberland. He attained the brevet rank of captain, and when his regiment was mustered out, he was aid on Gen. H. W. Slocum's staff. He studied at the Ohio Wesleyan University and Cornell, graduating from the latter in 1869, and the same year was admitted to the bar of Ohio at Cincinnati. From 1879 to 1882 he was judge of the Cincinnati superior court. He took an active interest in politics and was always a stanch Republican. He was governor of Ohio from 1886 to 1890, and on Jan. 15, 1896, was elected United States Senator to succeed Calvin S. Brice.

ARCHIBALD FORBES.

FORBES, ARCHIBALD, a British war correspondent; born in Morayshire, Scotland, in 1838, and educated at Aberdeen. He served some years in the Royal Dragoons. He was correspondent of the *Daily News* through the Franco-Prussian war, during the Commune in Paris, during the Prince of Wales's Indian tour, and in the Russo-Turkish and South African campaigns. In 1879 he rode 110 miles in 15 hours to report the victory of Ulundi. He published several books detailing his experiences, and has lectured in Great Britain, America, and Australia. His works include a novel, *Drawn from Life; Glimpses through the Cannon Smoke* (1880); *Barracks, Bivouacs, and Battles* (1891); *The Afghan Wars* (1892); *Colin Campbell, Lord Clyde* (1895); *Studies of War and Peace* (1895); *The Black Watch* (1896); and *Life of Napoleon III* (1898).

FORBES, JOHN COLIN, a Canadian artist; born in Toronto, Canada, Jan. 23, 1846. His first work was done without instruction. He afterward studied in Europe, especially in London. His reputation rests mainly upon his portrait-work, and among his sitters were Gladstone, Sir John A. Macdonald and Sir Charles Tupper. His miscellaneous works include *The Cañon in the Royal Gorge; The Foundering of the Hibernia; Sweet Sixteen;* and *The Lily.*

FORBES-ROBERTSON, JOHN, a British art critic and journalist; born in Aberdeen, Scotland, Jan. 30, 1822. Even before his graduation from Aberdeen University, he contributed articles in dramatic criticism to local papers. He engaged in business for several years, but, later, spent much of his time in art criticism. He was, for a time, editor of *Pictorial World* and was a constant contributor to various art periodicals. He published *The Great Painters of Christendom* (1877), *Life of George Jameson, the Scottish Painter*, and other works, all of which have been favorably received.

FORCE. See DYNAMICS, Vol. VII, pp. 582, 583; MECHANICS, Vol. XV, pp. 746–749; and ENERGY, Vol. VIII, pp. 205–211.

FORCE, PETER, an American historian; born near Little Falls, New Jersey, Nov. 26, 1790. For a time he was foreman of a printing-office in Bloomingdale, New Jersey, and in 1812 was president of the New York Typographical Society. In 1815 he removed to Washington, District of Columbia. Here he was engaged in the publishing business, and from 1823 to 1830 edited and published *The National Journal*, and several special government documents. In 1833 he was authorized by Congress to compile a vast work, to be called the *American Archives: A Documentary History of the English Colonies in North America*, covering a period from the discovery of America to the final ratification of the constitution of the United States. About one fourth of Mr. Force's work was completed when it was discontinued by Secretary Marcy. His collection of material was sold to Congress for $100,000. He published other works of historical importance. These include *Tracts and Other Papers Relating Principally to the Origin, Settlement and Progress of the Colonies in North America* (1836–46).

FORCE, TUBES OF. See ELECTRICITY, § 9a, in these Supplements.

FORCE BILL, otherwise known as the FEDERAL ELECTIONS BILL, a measure introduced in the Lower House of Congress, March 15, 1890; considered from June 25th to July 2d; passed the House the

last-named date and went to the Senate. It was reported in the Senate August 7th, but not taken up until December 2d. It was debated until January 5th, when it was laid aside indefinitely by a vote to take up the Silver Bill. The Force Bill provided for Federal regulation of elections in any county, in any state in the Union, upon petition of at least fifty citizens. It was a Republican measure, excited intense opposition, and was made an issue in the national campaign of 1892.

FORCIBLE ENTRY AND DETAINER, a legal phrase used to describe an unlawful entry upon real estate, such as lands and tenements, accomplished by means of force—*vi et armis*, as the old indictments ran. Feudalism, until the passing of the Statute of Forcible Entry (5 Rich. II, c. 8), was the golden age of forcible entry. Then each petty feudal lord took and retook lands as the fancy seized him, or the forces were numerically in his favor. The exercise of this right was found to be so prejudicial to the public peace that the statute forbade the exercise of a right of entry except where it was given by law, and then only in a peaceable manner, "not with strong hand, nor with multitude of people." Following this statute, the laws of many of the separate states prescribe punishments for the offense of forcible entry. In every case a civil remedy also exists, and a person detaining lands and tenements belonging to another can be dispossessed by due process of law.

FORCING, in gardening, the artificial application of heat to accelerate vegetation. Many of the fruits and vegetables which grow well in the open air are very commonly forced, in order that they may be procured at seasons when they could not be without artificial means. See HORTICULTURE, Vol. XII, pp. 215, 246.

FORD, EDWARD ONSLOW, a British sculptor; born in London, July 27, 1852. He studied painting in Antwerp and Munich. In 1871 he turned his attention to sculpture, and returned to England in 1874. Among his best-known statues are *Sir Rowland Hill* (1882); *W. E. Gladstone* (1883); and *Henry Irving as Hamlet* (1883).

FORD, SIR FRANCIS CLARE, a British diplomatist; born in 1830; was in the army from 1846 to 1851, and then entered the diplomatic service. He was *chargé d'affaires* at Carlsruhe (1862–63); at Buenos Ayres (1865–66); secretary of embassy at St. Petersburg (1871–75); commissioner to Halifax (1875–77); minister to the Argentine Republic (1878); envoy to Uruguay (1879); and to Brazil (1879–81); British fisheries commissioner at Paris (1883); minister at Madrid (1884); ambassador to Spain (1887); ambassador to Constantinople (1892), and to Rome (1893–98). He was made a privy councilor in 1888, and knighted in 1889. Died in Paris, Jan. 31, 1899.

FORD, WORTHINGTON CHAUNCEY, an American historical writer and statistician; born in Brooklyn, New York, Feb. 16, 1858. He studied at Columbia College, and was for a number of years an editorial writer on the New York *Herald*. He was appointed chief of the Bureau of Statistics in the Department of State, at Washington, District of Columbia, in 1885, and in 1892 chief of a similar bureau in the Treasury Department. He edited the 1879 edition of *Wells's Natural Philosophy*, and published a number of volumes, chiefly of letters of prominent Revolutionary characters. Among his publications are *The Standard Silver Dollar* (1884); *Writings of Washington* (1889–92); *Letters of William Lee* (1891); and *Correspondence and Journals of Samuel B. Webb* (1892).

FORDHAM, a station on the New York Central Railroad, 10 miles N. of Grand Central Depot, New York, was, in 1874, annexed to that city. It contains St. John's College, a Roman Catholic theological school, an academy for ladies, a female deaf-mute asylum and other educational institutions. Edgar Allan Poe's cottage is situated here.

FORECASTS, WEATHER. See METEOROLOGY, in these Supplements.

FORECLOSURE. See MORTGAGE, Vol. XVI, p. 848.

FOREFATHERS' DAY, the anniversary of the landing of the Pilgrims at Plymouth, Massachusetts, from the ship *Mayflower*. The day celebrated is generally December 22d, although the proper date is December 21st. This discrepancy is explained as follows: The date under the old-style method of reckoning was December 11th; according to the Gregorian or new-style method, in 1620 the addition of but ten days to the old style was necessary. When the Gregorian calendar was adopted in England in 1752, it was necessary to add eleven days. The first commemorators of the landing thoughtlessly added eleven instead of ten days, thus placing the anniversary on December 22d, instead of the 21st. The first organization for the celebration of the anniversary was the Old Colony Club, formed in 1769 at Plymouth. This club celebrated the day by banquet and speeches annually until 1773, when it disbanded. The churches of Plymouth, by special services, commemorated it from 1773 to 1780, and from 1794 until 1819, when another society was formed, the Pilgrim, and the formal banquet and speeches again made a part of the ceremony. Throughout New England the day is celebrated, and in every state in the Union where New Englanders have settled. The largest of the societies, outside of New England, is the New England Society of the city of New York, formed in 1805. See also HOLIDAYS, in these Supplements.

FOREIGN ATTACHMENT, a proceeding whereby the property of a debtor, who does not reside in the state, may be seized under legal process and held for the payment of the plaintiff's demand. Laws exist in almost every state of the United States, permitting this form of attachment. The purpose of such enactments is that a citizen of the state may have the most complete remedy which the law can afford him against a non-resident debtor who is not under the jurisdiction of the laws of such state, and thereby frequent injustice and vexatious delay are prevented.

END OF VOLUME II SUPPLEMENT.